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Editorial Notes

Papers and Discussions

IN last week's special Institution Number of the "JOURNAL," which included a full report of the discussions on all the Papers presented at the General Meeting of the Institution, we gave briefly a few of our impressions on the proceedings generally. We would now, in retrospect, examine in more detail what took place at the gathering, which, as far as attendance was concerned, registered a high record. Institution meetings become more and more formal, and there seems to be increasing difficulty in getting through the programme in time. Is it that too much is attempted, and that through feverish haste mental indigestion sets in? Would it be better to have fewer Papers? At all events, from start to finish the meeting was a fight against the clock, and during the discussions one had the feeling that the wood could not be seen for trees—such was the rapid fire of the technical musketry. In his Presidential Address Mr. Robertson pleaded that Authors of Papers might, to their own and everybody else's benefit, consider the charm of brevity. Yet he himself—and his thoughtful, well phrased Address was not of uncommon length—had not the time to read it. Following which, general disappointment was registered at the short time which remained for Dr. E. F. Armstrong to introduce his Murdoch Centenary Lecture.

Many of the Institution Papers these days are not Papers. They are books. Costly, erudite, and valuable books, no doubt—but books. We can well imagine the joy of one Author when he finds that his Communication weighs a pound or so more than that of another Author. The Institution Transactions for 1928-29, Vol. 78, weighed 2 lb. 5 oz. The latest Volume, No. 87, that for 1937-38, weighs 4 lb. 5 oz. We invite readers to join in a weight-guessing competition for the Transactions ten years hence. And what is going to happen at the next Autumn Research Meeting? Are we going to have reports containing every conceivable item of experimental evidence in support of the conclusions drawn as a result of the research in progress? Will it be a similar story of a fight against the clock during the discussions?

Presentation of Research

WE think we have arrived at a stage when the humblest gas engineer and manager shares the general view that research, and more research, is necessary for the continued progress of gas in a highly competitive age. It is unreasonable, however, to expect him to be concerned about every detail—all the niceties of method and calculation, and so on. He does not require the full detail of procedure—detail which constitutes the bulk of Institution research reports. This detail admittedly is essential to those contemplating or undertaking similar research either in the Gas Industry or in other fields, either in this country or abroad. The fact remains that it is material for discussion round the research table, and it should not be difficult to devise means of rendering this detail available to those who want it. In his Address Mr. Robertson spoke on the same subject—the erudite communications of the specialists relating to investigations concerning highly complex processes. "The publication of a detailed account may be essential to the specialist reader similarly engaged," he said, "but, if full practical value is to be derived from the labours of the specialist, it is essential that he should also cultivate the technique of presenting the practical aspect in an abbreviated form." And he expressed the view that the publications of all technical associations would benefit from more drastic editing.

Then, is there not a tendency at Institution meetings to foster an air of unreality and artificiality in the discussions on both Papers and Research Reports? Are we, in fact, encouraging a sort of "inner circle" debating society rather than free and open discussion. Many of the research workers and authors of Papers must know beforehand what several of those taking part in the discussions are going to say. The stage is set before the sessions commence. All highly efficient, but lacking in spontaneity. One by one the invited contributors add their quota; and it is not at all surprising to hear the expression: "There was no lack of discussion on such and such a Paper." We think we realize the difficulties, and we are certainly appreciative of the desire

so to arrange the meetings that the time allotted to discussion shall yield the most valuable results. Orderliness and crispness in the discussions are obviously desirable. At the same time, there is a danger—and our thought in this regard is, we know, shared by many—of making the discussions, and the meetings as a whole, rather mechanical, rather static, very dignified, highly cautious, and beyond the ken of the "little man."

Education and Salaries

WHATEVER truth there may be in the foregoing, it is certain that the prestige of the Institution, and its capacity for useful service, never stood higher. The evolution of the Institution was the theme of Mr. Robertson's Address; it is a story of development in which pride can be taken. Mr. Robertson showed how the policy of the Institution towards non-technical developments has consistently favoured the creation of special organizations to deal with such developments. It has consistently taken the initiative or lent its aid in furthering this policy. It has consequently been left increasingly free to pursue its own particular task—the furthering of the technical, professional, and educational interests of the Gas Industry. Referring to the Education Scheme, Mr. Robertson pointed with regret to the fact that, while 101 have taken the Institution Diploma in Manufacture since the scheme was inaugurated, only 9 have taken the Diploma in Supply, and only 3 have taken both. The explanation is that the Industry does not yet, in practice, attach much importance to technical training for Gas Supply. This is a serious matter. The need for a high standard of technical knowledge to deal with problems of distribution and utilization is to-day as great as that required for dealing with the problems of production. But, as Mr. Robertson said, judging from the salaries offered from time to time for vacancies advertised—and still more from salaries paid where the vacancies are not advertised—the personnel of the Industry is liable to suffer more from lack of appreciation of the financial value of technical education than from any defects in the Education Scheme itself. Undertakings which seek to economize in this direction are doing a disservice both to themselves and to the Industry.

A Gas Research Board

MR. ROBERTSON also referred to research and the steps which have been taken towards its better organization. For years this matter has been under discussion, and at the meeting Mr. H. C. Smith was at last able to present a special report upon what it has been agreed upon to do. A Gas Research Board is to be set up, a bureau of information is to be established, and a whole-time Director of Research is to be appointed. The Board will be sufficiently representative of the Gas Industry as a whole to satisfy the requirements of the Department of Scientific and Industrial Research if and when it is considered desirable to become so associated with the Department to qualify for Government grants. Before any application for financial aid is made, the Board is to be given a preliminary run to ascertain how effectively the two sides of the Industry—the gas manufacturing and supply side, and the makers of gas plant and appliances—can work together.

The Industry has had to wait a long time for discussions of ideas to crystallize into a plan of action, but we now have a concrete scheme, and we hope it will result in more effective co-ordination of research work in the Industry. The Institution will have a representation of nine members on the Council of the Board, the Society of British Gas Industries a representation of six. As Mr. Smith pointed out in his report, individual undertakings and firms engaged on each side of the Industry may be carrying out items of research which involve the taking out of patents. It is bound to take a little time for the two sides to settle down together and see what items of fundamental research can be done jointly to the ultimate advantage of both sides of the Industry without any interference with the rights or policy of individual undertakings. The scheme appears to us a logical development, and it is to be hoped that this fusion of the Institution and the S.B.G.I. will strengthen the scientific basis of the Industry. All will agree that there will be work in plenty for the Director of Research—and, as Mr. Evans remarked at the meeting, the choice of the right man is of supreme importance to the success of the scheme.

We shall doubtless return to fuller discussion of this highly important subject in a later issue.

The Industry's Finances

MADE available now by the publication of the Board of Trade Return, official figures show the year 1937 to have been one of increased profits for the authorized gas undertakings of Great Britain. It may be remembered that the Board of Trade figures, already noted in the "JOURNAL," revealed an increase of just over 2% in the quantity of gas sold during that year, so that, in normal circumstances, some increase in profits would be looked for. Taking all things into consideration, however, it is satisfactory that the increase in expenditure did not quite keep pace with the rise in receipts. This is shown by Part II. of the Return, dealing with prices and finances of all Authorized Gas Undertakings in Great Britain, which is issued by H.M. Stationery Office, at the price of 10s. 6d. net, postage extra.

In the year reviewed—that is to say, the calendar year 1937 in the case of companies, and the twelve months ended March 31, 1938, for local authority undertakings in England and Wales, or May 15, 1937, in Scotland—the receipts of the 706 undertakings on revenue account were £72,653,615, while the expenditure was £61,041,827, leaving a gross profit of £11,611,788. The receipts and expenditure exceeded those in the preceding year by £2,887,118 and £2,699,284 respectively—the gross profit being thus increased by £187,834. The aggregate amount of the issued capital (share and stock, including premiums paid in respect thereof) and issued loan capital of the companies and of money borrowed by local authorities (including loans borrowed and since repaid) was £233,149,039. In the 1936 Return, the amount was £225,849,568. On the present occasion, an abnormal increase in the total paid-up share and stock capital of the companies is stated to be accounted for by an issue during the year 1937 of nearly £3,000,000 of capital by the Gas Light and Coke Company.

Diminishing Company Numbers

THE number of companies included in the present Return is 406—amalgamations, &c., having reduced the total from the figure of 494, at which it stood as recently as 1920. The total paid-up share and stock capital of the 406 companies at the end of 1937 was £102,493,895, as compared with £97,878,916 in 1936; while the loan capital (including debenture stock) issued was £46,694,337, against £45,670,301 in the previous Return. The Revenue Account receipts of the companies

increased from £47,601,326 in 1936 to £49,267,296 in 1937; and the expenditure from £39,963,528 to £41,469,145. The gross profits were thus up from £7,637,798 to £7,798,151.

Glancing down the column giving the scale of annual charges for meter rent to private consumers, it seems that there is a good deal of variation in the practice in this respect, but that the making of some charge for meter rent is almost universal. Nine companies in England and Wales supplying meters free of charge are: Barnard Castle, Chester, Garstang, Mossley and Saddleworth, Rothwell, Settle, Solihull, Whitchurch (Salop), and Wollaston. In Scotland, free meters are supplied by one of the three statutory gas companies—the Busby and District Gas Company. In the cases of three companies—Chasetown, Cirencester, and Guisborough—one charge is made for all sizes of meter; while with the Leyland Gas Company the rent is 10% on cost of meters.

Other columns show the maximum, standard, or basic price of gas per therm, and the prices charged per therm on Dec. 31, 1937.

More Net Profit for Local Authorities

As already remarked, the figures for the local authorities relate to the twelve months ended March 31, 1938, and they furnish particulars relating to 300 authorized undertakings, which compares with a total of 306 included in the Return for the preceding year, and 320 for the financial period 1929-30. The total amount of money borrowed increased during the year under review from £82,300,351 to £83,960,807; while the total amount of loans repaid and balance in sinking fund rose from £56,080,953 to £57,851,884. The amount of loans outstanding is thus shown at some £100,000 less, with a figure of £26,108,923. At the same time, there follows a continuation of the downward trend of the past half-dozen years or so in the items of interest paid on loans, amount of loans repaid, and amount placed to sinking fund during the year, which in the present Return total £3,023,469, as compared with £3,108,759 in the preceding year.

On the present occasion the net profits resulting from the operations of undertakings owned by local authorities are up from £677,397 to £790,168—with one exception the highest figure shown for net profits since the financial period 1929-30. There is a column in the Return which shows, in the case of each undertaking, how the net profit realized was appropriated. The average sum is, of course, not big, and in many instances it was carried forward. With some undertakings, the whole, or part, was devoted to capital expenditure. The contribution of sums in aid of the rates is not now so frequent as it at one time was.

In the year under review, it is noted, running down the column, that the Barrow-in-Furness Corporation contributed £500 in aid of the rates; the Birkenhead Corporation, £3,700; the Blackpool Corporation, £2,000; the Burnley Corporation, £6,000; the Buxton Corporation, £600; the Darwen Corporation, £3,000; the East Dereham Urban District Council, £100; the Goole Corporation, £125; the Horsham Rural District Council, £76; the Lancaster Corporation, £1,000; the Leeds Corporation, about £10,000; the Meltham Urban District Council, £130; the Nelson Corporation, about £5,000; the Nottingham Corporation, £31,500; the Oldbury Corporation, £1,700; the Oldham Corporation, £4,000; the St. Helens Corporation, £5,871; the Shepshed Urban District Council, £200; the Southport Corporation, £3,170; the Spalding Urban District Council, £1,000; the Stafford Corporation, £2,000; the Stourbridge Corporation, £2,688; the Stratford-upon-Avon Corporation, £750; the Widnes Corporation, £3,872; and the Windermere Urban District Council, £547. The Salford Corporation placed £30,212 to the General Municipal Account.

The policy of supplying meters free of rent is more prevalent in the case of the local authority undertakings than it appears to be with the companies; and there are also several instances of one charge being made to private consumers for all sizes of meter. As in the case of the companies, the prices charged per therm for gas are as at Dec. 31, 1937.

Coal Mines Act, 1938

THE Coal Mines Act, 1938, imposes upon the Coal Commission the duty to endeavour to effect a reduction in the number of coal undertakings if it considers that the existing number is so great as to be detrimental to the economical and efficient working of coal. The Commission is not entitled to apply any compulsory powers until next year, but in the meantime it has produced an outline plan which has been circulated to all colliery owners. This plan is surprisingly detailed, and, while not intended to coerce colliery owners, clearly indicates the view of the Commission on the matter.

It is clear that the reorganization of an industry of such paramount importance as the coal industry cannot be made in a hasty manner. The vital interests of the nation are too closely woven with the well-being of the coal industry to render speed possible. Commercial and economic considerations, for instance, cannot be allowed to outweigh the social effects of the transference of labour from one area to another. It is obvious, however, from the statistics given in the memorandum that the number of small coal undertakings is still large. From the tables it would appear that there are over 650 undertakings producing less than 100,000 tons a year, and the relative proportion of the small to the large undertakings is particularly great in the bituminous pits of South Wales.

In recent years the Gas Industry has favoured the holding company system of control rather than that effected by total merger, particularly as this system combines the advantages of the survival of the local unit with the possibility of more expert management. The only form of co-ordination that can be enforced by the Coal Commission is that of total merger, and if the experience of the Gas Industry should be thought to be of value to the coal industry, the coal owners may well endeavour to promote and encourage the holding company movement before any form of compulsory merger is forced upon them.

The Gas Industry will be chiefly interested in the suggestions of the memorandum with regard to Durham, Yorkshire, and Northumberland. In Durham the Commission has assumed that the three larger amalgamated groups of collieries—*i.e.*, Dorman Long & Co., the Consett Iron Company, and Pease and Partners—will remain as they are. With regard to other coal undertakings, it suggested the formation of four groups—*i.e.*, a north-eastern group, producing 5¾ million tons; a central group (5 million tons); a south-eastern group (6½ million tons); and a north-western group (5¾ million tons). The south-west part of the county is left for further discussion. In West Yorkshire, three groups are indicated, by dividing the eastern portion of the area into a northern and southern section, and retaining the western portion.

It is stated that in Northumberland 70% of the output is already produced by four groups. The suggestion is made that

after a possible reduction of these groups to three, "each should extend itself by geographically appropriate mergers, with a view to ultimately combining with one another to form a single undertaking for the whole of Northumberland." The memorandum significantly adds: "The circumstances of this coalfield are such as to make it possible to contemplate an exceptionally large group like this without the misgiving which it might arouse in some other places."

The monopolistic selling powers conferred upon the coal industry make it imperative that the industry should put its house in order. The coal-buying public may well be forgiven for asking to what extent savings of expenditure are to be effected by schemes of this character. Wages are related to output, and any saving in the comparatively small item of directors' fees may be counterbalanced by the more highly-paid executive which would be essential to the management of the larger unit.

At the same time, the Gas Industry supports the policy of the elimination of the smaller units in its own household, notwithstanding the vague suggestions of possibilities of abuse which were made during the recent hearing before the Committee appointed by the House of Lords to enquire into the subject. Whether a similar policy is applicable to the coal industry is not within our competence to decide. From our point of view, the main question is whether such proposals will tend to reduce the present all too high cost of coal.

Personal

Mr. W. K. TATE, Engineer and Manager of the Sheppey Gas Company for the past four years, has left Sheerness to take up a position in London. A solid silver cigarette box was presented to him recently on behalf of the staff and employees by Mr. W. J. Cole, a Director of the Company.

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On June 10, Mr. T. F. S. COPE (Commercial Assistant to the City of Leeds Gas Department) was presented with a wireless set on the occasion of his retirement after 50 years' service with the Undertaking. Mr. C. S. Shapley, in making the presentation on behalf of the Head Office Staff and Heads of Departments, referred to Mr. Cope's loyal and efficient service and to the high esteem in which he was held by all those who had had the good fortune to come into contact with him. At the date of his retirement, he was the oldest employee in the Department in age and service and had served under four Engineers and General Managers, and ten Chairmen of the Gas Committee.

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The marriage took place on June 17, at St. Mark's, North Audley Street, of Jocelyn Henry Bonham-Carter, youngest son of Lieut.-Col. and Mrs. Herman Bonham-Carter, and Maud Lesley Athill, only daughter of Mr. and Mrs. L. C. H. Athill. Mr. Athill is London Manager of the Parkinson Stove Company, Ltd., and designer of many modern streamlined gas appliances. The bride and bridegroom first met in the service of the Gas Light and Coke Company, by whom they were both employed. It is interesting that the bride's great grandfather and the bridegroom's great uncle fought together at the siege of Sebastopol—the latter becoming Secretary to Florence Nightingale. An uncle of the bridegroom is now Secretary of the Florence Nightingale Fund which provides for a school of nurses at St. Thomas's Hospital.

Obituary

Mr. JOHN BENTLEY, J.P., of Russell Place, Great Harwood, who died on Monday, was for twenty-five years a member of Accrington and District Gas Board.

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Mr. CHARLES FREDERICK CATT, formerly Secretary of the Tunbridge Wells Gas Company for thirty years, died on June 12. He was also a Director of the East Grinstead Gas and Water Company.

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Following a serious operation, Mr. W. R. ADAMS, Secretary and Accountant of the Cowes U.D.C. Gas Department, died at St. Andrew's Hospital, Cowes, on June 15. He had been Secretary of the Gas Undertaking since 1922.

National Gas Council

Meeting of the Central Executive Board.

A meeting of the Central Executive Board of the National Gas Council was held at Gas Industry House, 1, Grosvenor Place, S.W. 1, on Tuesday, June 13.

Election of Chairman of the Board.—Sir David Milne-Watson, Bart., LL.D., D.L., was unanimously re-elected Chairman of the Board for the ensuing year.

Election of Vice-Chairmen of the Board.—The following Vice-Chairmen were unanimously re-elected:

Mr. William Cash, F.C.A., J.P.
Mr. Frank Jones, M.Inst.C.E., M.I.Mech.E., J.P.
Alderman J. H. Lloyd, M.A., J.P.
Mr. G. H. Kitson.

Reappointment of Committees of the Council for the Forthcoming Year.—Consideration was given to a list of the Committees of the Council, and those which had not completed their work were reappointed.

Election of Representatives of The Institution of Gas Engineers.—It was reported that the following representatives had been appointed to serve on the Board for the ensuing year, in accordance with the Rules:

Mr. Geo. Dixon, B.Eng., M.Inst.C.E.
Mr. R. Robertson, M.Inst.C.E.
Mr. John Terrace, M.Inst.C.E.
Sir Frederick J. West, C.B., M.Inst.C.E., J.P.

Coal.—A Resolution from the Management Committee of the District Executive Board for Yorkshire (W.R.) dated April 28, 1939, was considered, relative to the price of coal, together with a further Resolution of the same date from the South-Western District Executive Board.

Civil Defence Bill.—A memorandum had been circulated indicating the nature of the amendments which the Council obtained during the Committee stage of the Bill. The memorandum also indicated that there were some minor points with regard to which the Council would endeavour to obtain assurances from the Government.

It was reported that the Bill had received further consideration in the House of Commons the previous day, and that the discussion had been chiefly concerned with underground air raid shelters.

It was satisfactory to be able to report that the Government had accepted an amendment moved by Mr. Ross Taylor, M.P., that, where it was reasonably necessary so to do, Public Utility Undertakers should be entitled to divert or remove their mains at the expense of the Local Authority. A similar amendment relating to a new clause authorizing Local Authorities to construct air raid shelters in streets would be moved that afternoon.

Holding Companies.—A Report of the Proceedings before Lord Sankey's Committee was presented. It was announced that the Committee had adjourned the Enquiry until Nov. 16, after which they proposed to sit every Wednesday and Thursday.

Ordnance Survey Maps; Proposed Compounded Royalties.—It was agreed to recommend Members to accept the scale proposed by the Ordnance Survey Office for a compounded royalty payment by Gas Undertakings in lieu of periodical payments for the reproduction of Ordnance Survey Maps.

Road and Rail Agreement; Report of the Transport Advisory Council.—It was stated that a full Report with regard to this matter had been circulated to the members of the Board, giving the gist of the views and recommendations of the Transport Advisory Council. It was anticipated that the Ministry of Transport would give general effect to these Recommendations. Until the actual legislation had been introduced, no useful steps could be taken.

National Smoke Abatement Society.—It was reported that The British Gas Federation had recommended that the National Bodies should increase their subscriptions to this Society to 50 guineas each. It was agreed that the National Gas Council should increase their subscription to that amount.

Central Gas Advisory Board.—The following Members were re-elected to represent the Council upon the Central Gas Advisory Board for the ensuing year:

Mr. Stephen Lacey, B.Sc., M.Inst.C.E.
Mr. J. W. McLusky, M.I.Mech.E.
Mr. C. S. Shapley, M.I.Mech.E.
Mr. S Tagg, M.Inst.C.E., J.P.

Date of Next Meeting.—It was stated that the next meeting of the Board would take place on July 11.

News of the Week

Drafts of the Special Orders for which application has been made to the Board of Trade under the Gas Undertakings Acts, 1920 to 1934, by the Mansfield Corporation and the Whitehaven United Gas Company, Ltd., have been laid before both Houses of Parliament for approval by Resolution.

"How to Read a Menu" is the subject of a talk which will be broadcast on the National at 10.45 a.m. on Tuesday, June 27, by Miss Hilde Zimmermann, of the Radiation Research Kitchen. That will be of special interest to all gas undertakings in whose area Miss Zimmermann has already given demonstrations of continental cookery.

To the Rhyl Council, the Gas Engineer and Manager, Mr. O. P. Cronshaw has reported that tenders have been invited for the erection of a new gasholder. A special meeting of the Committee will be held on June 21 to consider the tenders. Mr. Cronshaw reported that it was desirable, if the proposed new gasholder was to be completed before next summer season, that the work should be commenced not later than September.

An Invitation to the Women of Tyneside has again been extended by the Newcastle-upon-Tyne and Gateshead Gas Company, who have offered their services to Tyneside women's organizations to arrange lectures, talks, demonstrations, film shows, and other events either at the headquarters of organizations or in the Company's demonstration theatre. A minimum audience of 150 is requested. The service comprises cookery, menu planning, dietetics, food preservation, health, homecraft, home laundry, kitchen planning, special courses, colour schemes, sweet-making, icing, and decoration and films.

To Meet a Deficit on the working of the Gas Undertaking arising from the additional cost of coal, rates, &c., the Rochdale Corporation Gas Committee proposes to increase gas charges by 10%. On the year's working to March 31 last, there was a net deficit of £4,526 as compared with a net surplus of £6,822 in the previous twelve months. The 10% increase in the price of gas will, in the case of consumers on the two-part tariff be met by raising the standing charge from 10s. to 12s. 6d. per quarter and leaving the price of gas to them at 6d. per therm. The 10% increase will mean an extra 1s. a quarter to ordinary consumers using 10s. worth of gas and so on in proportion.

Successful Cookery Demonstrations were arranged recently by the Newbury Gas Department in conjunction with Falk, Stadelmann, & Co., Ltd., good attendances being recorded. The demonstrations were held in the Gas Showrooms, and the demonstrator was Miss E. D. Newberry.

At the Annual Luncheon of the British Standards Institution last Thursday, Dr. E. F. Armstrong, who presided in the absence, through ill-health, of Sir Frank Heath, said that the past year had proved a record one for the Institution, the support given being greater than ever. Mr. R. S. Hudson, Parliamentary Secretary to the Department of Overseas Trade, said there was no doubt at all that standardization had helped to reduce costs and to foster co-operation between manufacturers and consumers. It had helped to solve the problem of making available stocks of spare parts.

Branch Showrooms have been opened by the Stockport Corporation Gas Department in Reddish. The premises are centrally-heated by a gas-fired boiler, which may be seen in operation. Adjoining the demonstration room is a model kitchen, showing the refrigerator, cooker, washing machine, and sink heater, all connected up and ready for use. In the showroom is a special hot water display of geysers of all types, including multi-points, for supplying hot water to all points, bath geysers, boiling water geysers for tea-making, &c., also the popular small sink heater.

During the Year 5,000 New Cookers were sent out by the Company, said the Rt. Hon. James McMahon, a Director of the Company, presenting the prizes won in the annual cookery competitions of the Alliance and Dublin Consumers' Gas Company last week. Forty-seven schools entered and the students actually examined numbered 3,042 against 2,945 last year. There were 587 prizewinners, compared with 553 in 1938 and the amount awarded in prizes was £265 against £250 last year. The popularity of the competition is increasing year by year. Each successful competitor was awarded a certificate and cheque. The majority of the candidates who sat for examination were girls, but of twelve boys who presented themselves three qualified for training as chefs.

Forthcoming Engagements

June.

22.—**I.G.E.**—Ad Hoc Joint Committee on Research, 3.30 p.m.
22.—**S.B.G.I.**—Council Meeting, 11.15 a.m.
23.—**North of England G.M.A. (Auxiliary Section).**—Half-Yearly Meeting at Newcastle-upon-Tyne and Chairman's Address by Mr. G. J. Duncan.
23.—**Southern Association (Eastern District).**—County Meeting at Southall.
23.—**Southern Association (Western District).**—Commercial Meeting, Rougemont Hotel, Exeter, 2.15 p.m.
23.—**Waverley Association.**—Annual Meeting at Edinburgh.
24.—**London and Southern Juniors.**—Summer Visit to Windsor.
28.—**I.G.E.**—Board of Examiners, 9.30 a.m.; Oral Examinations, 10 a.m.; Board of Examiners, 2 p.m.
29.—**I.G.E.**—Gas Education Committee, 11 a.m.; Gas Education Conference, 2.30 p.m.

July.

4.—**B.C.G.A.**—Executive Committee, 11.30 a.m.; General Committee, 2.30 p.m.
4.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
10.—**I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
11.—**I.G.E.**—Council Meeting, 10 a.m.
11.—**N.G.C.**—Central Executive Board, 2.30 p.m.
13.—**I.G.E.**—Joint Committee on Complete Gasification under Pressure, 3 p.m.
17.—**L.C.C.A.**—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
18.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
21.—**I.G.E.**—Liquor Effluents and Ammonia Committee, 11.30 a.m.; Joint Research Committee, 2.30 p.m.
24.—**L.C.C.A.**—Technical Committee, 3 p.m.
25-26.—**Irish Association.**—Annual Meeting in Dublin.

Letter to the Editor

An Expression of Thanks

SIR,—May I ask for a small space in your columns to thank my many friends in the profession for their most kind and helpful letters during the past few days, and in return to wish them all continued success, good health, and happiness.

Yours, &c.,
CHAS. E. WRIGHT,
Chief Engineer.

Ipswich Gas Light Company.
June 19, 1939.

Amalgamation and Grouping

United Kingdom and Stockport.

The Stockport Town Council rejected a motion against allowing the Gas Undertaking to pass out of municipal ownership and control. The Council was informed that though a representative of the United Kingdom Gas Corporation, Ltd., had met the Gas Committee, no negotiations had been started and that whatever proposals might be made would be brought before the Council for acceptance or rejection. The minutes of the Gas Committee recorded a special meeting at which Colonel W. Moncrieff Carr, O.B.E., T.D., Managing Director of the United Kingdom Gas Corporation, Ltd., was present to explain the objects of his Corporation and the proposed scheme for the co-ordination of the gas supplies in the area. He had asked to be furnished with information regarding the Stockport Gas Undertaking to enable him to make an investigation and submit proposals, without commitment on either side, for the acquisition of the Undertaking. The Committee decided, without commitment, to supply Colonel Carr with the information desired.

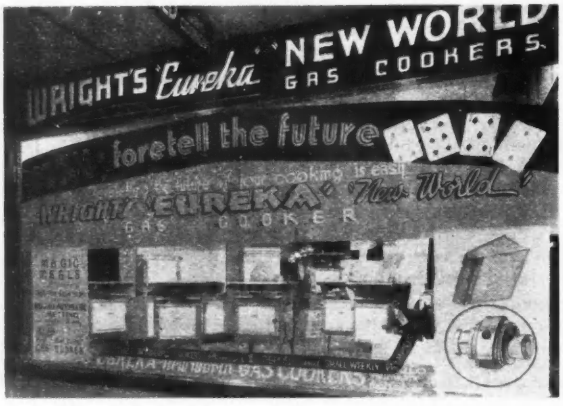
Winsford Open New Showrooms

Spacious showrooms have been opened by the Severn Valley Gas Corporation at Winsford. The premises include offices and a demonstration theatre and are situated in the shopping centre of the town. The opening ceremony, which was performed by the Chairman of the Winsford Urban District Council, Mr. R. G. Barton, followed a luncheon attended by members of the Council and others prominent in the public life of the town.

Mr. J. H. Booth, Engineer, Manager, and Secretary at Winsford and Middlewich, introduced Mr. S. G. M. Wood, Chairman of the Winsford Gas Company and a Director of the Severn Valley Gas Corporation. Mr. Barton recalled that the Council had bought the Gas-Works from the old Wharton and Over Gas Company and he could assure them there was much more controversy over the purchasing of the Works by the Council than there was over the recent selling of them. The town would appreciate the new premises which would be a valuable asset.

Mr. G. M. Gill, Director of the Severn Valley Gas Corporation, said he hoped the public would, through the showrooms, learn that gas was a thoroughly modern product, and not, as so many imagined, old-fashioned. Mr. Thomas Beswick, a well-known coal factor of Knutsford, thanked the Directors on behalf of the guests

Mr. Henry Egerton, of Messrs. Egerton & Sons, of Manchester, the contractors, presented a bouquet to Miss Barton, and an inscribed wallet to Mr. Barton.



A striking window display in the showroom of Mr. R. J. Sharpe, at Perth, Western Australia, by the courtesy of Radiation Ltd.

Keith Blackman, Ltd.

Annual Report of the Directors

The annual report of the Directors of Messrs. Keith Blackman, Ltd., states that the amount of business done during the year slightly exceeded that of the previous year. An additional 11,597 Preference Shares of £1 each were subscribed for and allotted in full in October last, bringing the total number now issued up to 150,000. The price of issue was 21s. each, and the premium thereon, after writing off expenses of issue, was used in writing a further amount off plant. New works and offices have practically reached completion and are now in full occupation. The Registered Office and executive staff were transferred from 27, Farringdon Avenue, London, E.C. 4, to Mill Mead Road, Tottenham, N. 17, on March 13, 1939. A City Office for the London representatives was at the same time opened in Bush House, Strand, W.C. 2. It will be appreciated that there has been a good deal of unavoidable dislocation in production during the past financial year arising out of the removal of the plant and personnel, which has reflected itself in the year's profit, as shown. It was partly with this in view that the Directors carried forward a large sum last year. After providing for payment of Preference Dividend and making sufficient allowance for depreciation and reserves against doubtful debts, National Defence Contribution, and income-tax on the year's profits, the audited accounts show an available balance standing at the credit of the Profit and Loss Account of £56,588. The Directors recommend that this sum be appropriated as follows: Declare a dividend on the Ordinary Shares at the rate of 15% less income-tax at 5s. 6d. in the £, absorbing £27,188, carry-forward to the current year £29,400—£56,588.

The Industry in Switzerland

Gas at Zurich National Exhibition

Mountain waterfalls play a large part in energizing Swiss Industry. So it was interesting to learn, from an interview a correspondent had with an official of the Zurich Gas-Works, that gas is the fuel mainly used by housewives in this little Alpine paradise.

Altogether, in a total population of 4½ millions, some 600,000 Swiss *Hausfrauen* "plump" for gas cooking; and, as the Swiss *Frau* stands to be divorced if her housekeeping abilities fail to satisfy her husband's taste or purse, gas in Switzerland comes through as severe a test as anywhere in the world.

Gas has its own huge cheerful pavilion in the beautiful National Exhibition which is being held in Zurich until the beginning of November. At this Exhibition, which is held every 25 years, each Swiss industry shows what it has accomplished since the Exhibition was last held. Gas has a very fine exhibit, mostly devoted to the domestic side. Special dishes from all the 22 Cantons which make up Switzerland—French, German, and Italian speaking—are prepared in the Exhibition Hall.

In addition to private households, many restaurants, hospitals, and public institutions use gas for cooking, and many laundries use it for their ironing. Central heating in big family houses is often by gas.

A cubic metre of gas costs the consumer 25 centimes, which is slightly under 3d., and last year 260 million cub.m. were produced in Switzerland. Alone, Zurich, the most populous town in the country and known as the industrial capital, consumed 58 million cub.m.

Switzerland boasts a gas station with the highest situation in the world. At Davos, in the winter sports region, the works is 5,600 ft. above sea level. Where possible, the remote hamlets on the mountain slopes are connected with the gas mains. However, most of the 72 gas stations in this very mountainous country are situated in the 30% plain-land; that is, to the North, near the German border, where the bulk of the population dwells.

In the minds of many people Switzerland conjures up a picture composed merely of yodellers, waiters, and cheese-makers. Never was there so gross a fallacy. Swiss engineering stands at as high a level as that of any other industrial country, and all Swiss gas appliances undergo continual improvement. Of a large number of appliances seen by this writer may be mentioned a safety automatic heater by Soha, of Zurich, from which it is impossible for gas to escape. A new kind of safety tap has been introduced for cooking stoves by Bono, of Zurich. This is on a spring, which must be pulled out before it can be turned, and is beyond a child's strength to manipulate. The surface parts of this stove can be lifted apart for cleaning by the housewife within a second or two.

Swiss gas firms arrange special exhibitions from time to time and advertise extensively in the Press and with luminous signs. The Swiss Gas Industry has, of course, its own Journal, which is published at Zurich.

Athletic and Social

Plymouth and Stonehouse Recreation Club.

The President of the Plymouth and Stonehouse Gas Light and Coke Company's Recreation Club, Col. R. L. Norrington, presented the trophies at the annual smoking concert, which took place at the Farley Hotel, Plymouth, on June 2, and was largely attended. Visitors included representatives of the Devon County Football Association, Plymouth and District Football League, and Devon Association League. The trophies presented by Col. Norrington included the following:

Inter-Department Club Room Tournament.—Distribution Department; runners-up, George Street.

Darts Cup.—G. Sharkey.

Devon Senior Cup presentation to Captain of First XI.—A. Hawkey.

Devon Senior Cup Medals.—F. Stear, F. Horwell, R. Lawrence, A. Martin, E. Carder, S. Mills, R. Jewell, F. A. Hern, T. Beard, A. Hawkey, R. Shewbrooks, A. Ferris.

The foregoing, as well as F. Bassett, also received Plymouth and District, Division I., runner-up cups.

Nottingham Pensioners' Third Outing.

For the third year in succession the pensioners of the Nottingham Corporation Gas and Public Lighting Departments were taken on a country outing to Dovedale by the Lighting Department Benevolent Fund on June 8. The party numbered 150 and at Chaddesden they were joined by Mr. R. M. Wilkinson, Assistant Gas Engineer.

Bath Gives Bulk Supply to Calne

No Dismissals and Workers to Share in Co-Partnership

On June 13 a bulk supply of gas from Bath to Calne was inaugurated, the Mayor of Calne (Councillor B. I. Dixon) turning on a valve, which released Bath gas to the area of supply of the Calne gas undertaking. As our readers are probably already aware, the Bath Gas Company recently purchased the Calne Undertaking from the Calne Corporation. Following the ceremony members and officials of the Calne Corporation and Directors and Chief Officials of the Bath Gas Company assembled at Fortt's Restaurant for luncheon.

After the drinking of the Loyal Toast, Mr. KENNETH MACDONALD, Vice-Chairman of the Directors of the Bath Gas Company, proposed "The Mayor and Corporation of the Borough of Calne," coupling with it the name of the Mayor of Calne. After expressing regret at the absence of the Chairman of the Directors (Mr. H. Stanley Taylor), Mr. MacDonald thanked the Mayor and Corporation of Calne for what had taken place during the negotiations. He would like to express appreciation of the very friendly relations which were maintained by the Gas Company and the Corporation in all their negotiations.

Now that the main had been laid from Bath to Calne and gas had been supplied from Bath, the Works at Calne would be closed down, but they hoped it would not be necessary to dispense with the services of any of the Calne workmen; in fact, they expected that a larger number would be employed on distribution. They would be entitled to become members of the Co-Partnership Scheme under which they would take a share in any bonus that was declared and would become shareholders of the Bath Company, while, as regarded pensions, their services with the Calne Gas Undertaking would be treated as service with the Bath Company.

Acknowledging the toast, the MAYOR OF CALNE said he felt they could say with perfect sincerity that that business transaction was one to the entire satisfaction, not only of the vendor, but of the purchaser.

The toast of "The Contractors," coupled with the name of Mr. J. H. Blackford, was given by Mr. J. WESLEY WHIMSTER, Director, Engineer, and Manager of the Bath Company. He expressed the Directors' thanks to the contractors who had laid the main to Calne, and said the agreement between his Company and the Calne Corporation for the transfer of the Undertaking was signed on March 23, 1938, following which application was made to the Board of Trade for an Order to carry the agreement into effect. The Order was issued on March 31, and the transfer took place on April 1. Preliminary arrangements had been made for laying a main from Bath to Calne, and on completion of the transfer an order was immediately placed for the steel pipes, and a contract entered into for the excavation of the trench. The main extended from Lacock to the Calne works, *via* Bowden Hill and Sandy Lane. It was 10 in. in diameter as far as Sandy Lane, and was then reduced to 8 in. in diameter. It spoke well for all concerned that the 7½ miles were completed in just over six weeks, or at the rate of about 1¼ miles per week. The main, on being tested at a pressure of 80 lb. per sq.in., proved to be bottle-tight. An extension of the main was now being laid from Sandy Lane to Derry Hill to supply Derry Hill and Studley, and houses *en route*, numbering 186, were being connected.

Mr. J. H. BLACKFORD replied in suitable terms.

The company then adjourned to Old Bond Street to see the spacious showrooms of the Bath Company, and arrangements were made to meet the wishes of some who expressed their desire to visit the Gas-Works.

The gas supply in Calne started about 105 years ago and has always been manufactured at the Horsebrook Works. It was for many years run by a public company, which was purchased by the Town Council in 1920.

The main consideration of the Council in selling their Undertaking to the Bath Gas Company was that owing to the rapid growth of the Undertaking, the storage capacity became inadequate, making it necessary for the Council to secure a new holder and plant. This would have involved a very heavy capital expenditure.

Institution Discussion

In our report of Mr. R. G. Shadbolt's contribution to the discussion at the Annual Meeting of The Institution of Gas Engineers on Communication No. 212—"Installation of Tower Gas Purifiers" by Mr. C. M. Croft, M.Inst.C.E., M.I.Mech.E.—there are two errors on p. 860 of our last issue. Beneath the caption "Yield from Spent Oxide," line 9, for 45 ft. read 25 ft. and line 15, for bars or wider spaces, read bars *and* wider spaces.

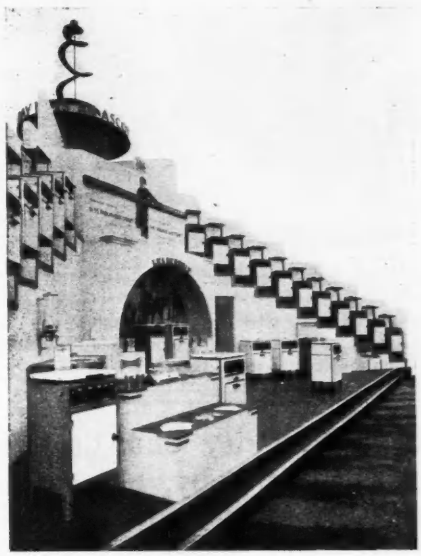
Gas is News in Canada

Supplement to Toronto Newspaper

Gas is definitely news, and, when presented in the attractive manner of a supplement to the Toronto *Saturday Night* of May 6, makes fascinating reading for the layman. We in the Old World have quite a lot to learn from the New in the matter of publicity and this supplement is a case in point. To begin with it is printed on good paper and all blocks have a "screen" fine enough to lend definition to every interesting detail. The lay-out and type are discreet but appealing and, above all, the matter is really worth reading. Advertising is present only in due quantity and the impression, so often left by supplements, that what matter there is for reading is really nothing more than padding for advertisements, is quite reversed in this case. While on the question of advertising, it is interesting to note, in view of divided opinion on the matter in this country, that all those appearing in this Canadian supplement are positive. That is to say, they seek to "glamourize" gas and gas service and not to "knock" their opponents.

We are indebted to Mr. George W. Allen, Secretary-Treasurer of the Canadian Gas Association, for receipt of a copy of this fine supplement.

Fine Display at Nottingham



This impressive display by the Parkinson Stove Company, Ltd., formed a section of the Nottingham Gas Department's stand at the recent Nottingham Exposition.

Women's Gas Council

Birmingham Outing to Royal Tournament

Nearly 800 members and their friends took part in the fourth annual outing of the Birmingham Branch of the Women's Gas Circle, which took place on June 1. The venue this year was the Royal Military Tournament, Olympia.

The party travelled to London in two trains, arriving at Addison Road at approximately 1.25 p.m., luncheon being served *en route*. After seeing the matinee performance of the Tournament, the members were conveyed from Olympia by special buses to Lyons' Coventry Street Corner House for tea, and at 6.30 p.m. rejoined the buses for a tour of the City. This concluded at Paddington, where the party entrained for Birmingham, reaching Snow Hill Station at 10.45 p.m., supper being enjoyed during the return journey.

Among those who took part were Mrs. A. W. Smith, wife of the General Manager and Secretary of the Birmingham Gas Department, and Lady Humphries, a Vice-President of the Circle. Miss M. Wolseley-Lewis, Chairman of the Executive Committee, and Miss K. M. Halpin, Organizing Secretary, joined the party for the Tournament and tea.

The entertainment and drive were most enjoyable, and, as on all the former outings, the weather was favourable, adding greatly to the success of the excursion.

Institute of Fuel

The Council of the Institute of Fuel announces that Lt.-Colonel J. H. M. Greenly, M.A., C.B.E., F.Inst.F., has agreed to continue as President of the Institute for a further year and will deliver his second Presidential Address to the Members in the Meeting Room of the Institution of Mechanical Engineers on Thursday, Oct. 19, at 2.30 p.m.

The Council have also decided to award the Melchett Medal for 1939 to Mr. H. A. Humphrey, M.Inst.C.E., M.I.Mech.E., M.I.E.E., F.Inst.F., late Consulting Engineer to Imperial Chemical Industries, for the outstanding work he has done in the development of fuel and appliances in connexion therewith. Mr. Humphrey will deliver the Melchett Lecture on Oct. 19, the Medal itself being presented at the Annual Dinner and Dance of the Institute which is being held at the Connaught Rooms the same evening.

This ingenious display was arranged recently in the Head Office Showroom Window of the Alliance and Dublin Consumers' Gas Company. The colour scheme was carried out in white and silver and the appliances and lettering in blue, while rose petals strewn on the floor completed a very attractive show.

Whessoe Foundry and Engineering Company, Ltd.

Annual Report

The Directors of the Whessoe Foundry and Engineering Company, Ltd., in submitting the accounts of the Company for the year to March 31, 1939, state the profit for the year, including interest and profit on investments realized, amounts to £168,444, from which there fall to be deducted depreciation of land, buildings, plant, and machinery, £7,631; Directors' fees, including income-tax thereon, £2,396; welfare schemes and provident funds, £2,993; provision for bonus to staff and workmen, £6,000; provision for A.R.P. expenditure, £10,000; investment reserve, £5,000; and provision for taxation, £50,389, leaving unappropriated surplus for the year a sum of £84,035, to which must be added the amount brought forward from previous year (after payment of dividend and Directors' commission on profits) £22,146, making a total of £106,181. Out of this sum the Directors have transferred £25,000 to General Reserve and recommend the payment of a dividend of 40% (less income-tax at 5s. 6d. per £) requiring £58,000, leaving to be carried forward (subject to Directors' commission on profits) £23,181. If the dividend recommended above is approved by the Annual General Meeting, the dividend warrants will be posted on June 26. The programme of modernizing and extending the Works is now virtually completed by the erection of the new welding shop referred to last year. This, coupled with continuous research directed to the extension and improvement of the Company's products, has enabled it to take advantage of a period of special activity in the Industry. As a result, the production and the profits of the year under review have constituted a new record in the history of the Company. Continued progress has been made in the technique of welding as well as in the variety of products in which the Company specializes. The efficiency and capacity of the Works have been further improved, and the relations between the management and the employees continue to be most satisfactory.

A Worthy Example for Landlords

Gas in Stratford-upon-Avon Housing Schemes

Among the better known and greatly appreciated English beers that of Flower's Brewery, Stratford-upon-Avon, stands high in the estimation of the adherents to the dictum "Beer is Best—Stick to Beer." Messrs. Flower & Sons, Ltd., as is to be expected of those who brew such an excellent beverage, are very solicitous for the welfare of their employees and recently they have provided model cottages for their employees. Each of these cottages has a large living room 26 ft. long by 12 ft. wide, kitchen, three bedrooms, and spacious cupboards which will accommodate all reasonable household requirements.

At the one end of the large living room a "Wallflower" panel heater is fitted on the wall. This supplements a solid fuel fire which also heats the water. Inside the working kitchen provision is made for rubbish to be disposed of without going out of doors. There is also provided an enamelled gas cooker, point for gas iron, and an enamelled washing machine. The gas equipment was, of course, supplied by the Stratford-upon-Avon Gas Department.

The rent of the cottages is 8s. 9d. per week inclusive.

Another development with which the Gas Undertaking is connected is on the outskirts of the town on the Evesham side, where a pair of cedar wood cottages has been built by Hardwick Structures, Ltd., for Mr. F. Flower, of Messrs. Flower & Sons, Ltd. They are charmingly designed and each house is fitted with a kitchen cabinet, hot water supply (solid fuel and gas heated), enamelled gas cooker, and a "Wallflower" panel heater in bedroom. The cottages are built for Mr. Flower's farm workers and constitute the last word in modern interior convenience. The provision by a landlord of a gas washing machine for newly-erected cottages is a worthy example to be followed.

The Stratford-upon-Avon Corporation has just completed a scheme of ten workmen's dwelling houses of the two bedroom type in Mansell Street. Gas has been installed for lighting, cooking, and wash-boiler, and a point provided for a bedroom fire.

Several housing schemes of recent years in Stratford-upon-Avon have included gas for all lighting.

Cookery as a Folk Craft

Liverpool Competitions

"Three thousand people have watched these cookery demonstrations by Fräulein Zimmermann, and the exhibition at the Walker Art Gallery and the competitions held here have done a great deal to bring home to Liverpool housewives and prospective housewives the mode of life of their sisters in other countries," said Lady Clayton, wife of Sir Christopher Clayton (Chairman of the Liverpool Gas Company), when she distributed the prizes to the winning clubs at the conclusion of the Folk Cookery competitions organized by the Liverpool Gas Company in conjunction with the Liverpool Union of Girls' Clubs, at Radiant House, Liverpool, on June 1.

Sir Christopher Clayton, who presided, complimented Fräulein Zimmermann, who gave the demonstrations and judged the competitions.

Fräulein Zimmermann said she thought that this was the first time that cooking had been introduced in the sense of being a folk craft. The national dishes made had been contrived of the materials provided by the country which the dish represented. The clubs had embarked on the adventure of making the different dishes, and she congratulated them on their pluck and for the way in which they went about their task, for it was easy to cook dishes which one had never seen or tasted before. The benefit of the cookery classes of which some of the clubs had had the advantage showed itself noticeably in the results of the competitions.

The cookery demonstrations and competitions were held in the Little Theatre, Radiant House, Liverpool.

Twenty clubs took part in the competitions held during the evenings, while each afternoon Fräulein Zimmermann cooked the dish which was the subject of competition in the evening. A golden spoon was presented to the winning club, with three silver spoons to those placed second, third, and fourth. Every member of a team participating received a cookery book.

The winners of the golden spoon awarded for the club with the highest number of marks out of a possible 300 were the members of the Jubilee Club, with 290 points.

A Coke Association for Lancashire

We learn from the Secretary, Mr. W. Stephenson, that a Lancashire and District Coke Association has now been formed, and business is being carried on at 38, Kennedy Street, Manchester, 2.

Passage of Flame Through Perforated Plates

by L. T. MINCHIN,
Gas Light and Coke Company.

Presented to the Congrès de Chimie Industrielle at Nancy, September, 1938.

Summary.

The passage of flame through sheets of perforated metal is studied, extending the work of Holm (Phil. Mag. (7), **14**, 18 (1932), who confined his investigations mainly to single holes.

The closer the holes are grouped together, the smaller must they be if flame is to be stopped; and it is suggested that this is explained by inter-radiation between the small flames emerging from the plate. A formula connecting the critical values of diameter of hole and distance apart is developed on this basis, which gives reasonable agreement with the experimental facts. The effect of temperature is also briefly considered.

It is frequently necessary, in connexion with the design of gas appliances, to know how a burner head can be designed so that flame will not pass back through it, even when the velocity of efflux is reduced to zero. Since the available literature does not contain the data necessary for this purpose, some further experiments described in this Paper have been made to ascertain the critical dimensions.

Previous Work.

Previous work on this subject by Marsaut,[1] Schondorff,[2] La Société de l'Industrie Minérale,[3] and more recently by the Miners' Lamp Committee[4] in England has been concerned with methane explosions and their passage through wire gauze in the miner's safety lamp. A related problem is the passage of flame through the casing of electrical apparatus used in coal mines, which has been thoroughly investigated by the Safety in Mines Research Board.[5] In all these cases, however, the flame is propagated through the inflammable mixture for some distance before it encounters the obstacle. Furthermore, a very considerable rise in pressure may take place in electrical machinery casing which introduces a fresh factor—cooling by adiabatic expansion—into the problem.

Closer to the problem under investigation was the work of J. M. Holm,[6] who caused a mixture of air and gas to flow through a small orifice and then reduced the rate of efflux until the small flame either was extinguished or else fired back into the mixing vessel. The effect of varying the diameter of the hole, the thickness of the hole and the proportion of air to gas was observed, and a theoretical formula connecting the variables was deduced. This was based on the assumption that the extinction of flame was due to the increased superficial area in proportion to volume of the element of flame which began to penetrate the hole, and hence its increased heat loss in proportion to its rate of heat formation.* Some of Holm's results are shown in fig. 1 (Glasgow town gas).

Perforated Plates.

When, however, we consider the passage of flame through plates in which a number of holes have been perforated close together it is found that a diameter of hole which, singly, would stop a flame is not sufficient when the hole is one of a cluster. Furthermore, the passage of flame is facilitated as the holes are grouped closer together. This is easily explained on the basis of Holm's theory, for the flame fronts emerging from the back of the perforated plate will receive warmth and encouragement from the flame fronts emerging through adjacent holes—*i.e.*, the radiation loss will be reduced by the proximity of the other flames, and smaller elements of flame will thus be enabled to survive.* Holm, however, following Wheeler's original exposition, seems to have regarded the heat loss as mainly due to conduction to adjacent layers of colder gas. If this were the case, it would be difficult to see why a cluster of holes should pass flame more easily than a single hole, and we have therefore assumed throughout that an important part of the heat loss must be by radiation.

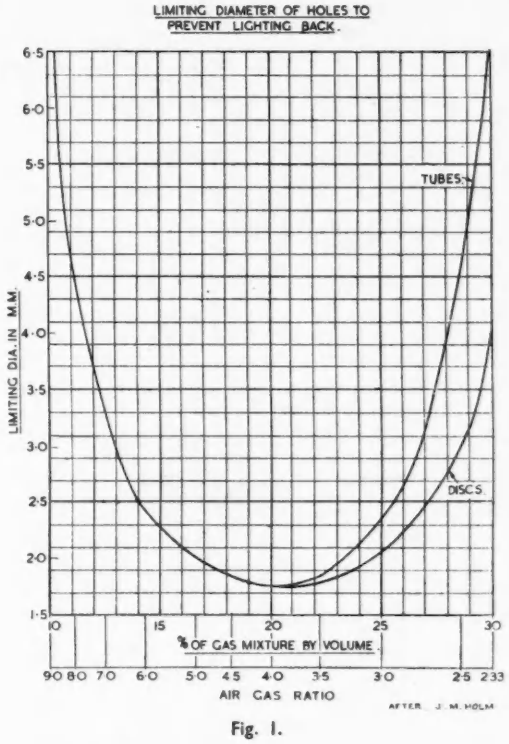


Fig. 1.

Method of Experiment.

The experimental method was similar to that of Holm; town gas and air were passed through meters into a mixing tube from which they passed to the burner head under consideration. The whole or part of the stream could be diverted to the open air without alteration in the ratio air-gas, and by this means the velocity of efflux was reduced until the flame either fired back or was extinguished. Specimens 1a to 21a were of commercial perforated sheet brass, each mounted in a brass holder so that approximately 6·5 cm². were exposed. The remaining specimens 1-11 were made from blocks of brass, drilled over an area of approximately

* This principle had been enunciated some time previously by Wheeler[7]: "Imagine a small sphere of hydrogen and oxygen 1 mm. in diameter at atmospheric pressure heated by an electric spark; the complete combustion of the gases in this sphere (·5 cu.mm.) would yield less than 1/1,000 small calorie. In order to spread the flame, this heat has to be communicated to the spherical shell of unburnt gas in contact with the sphere (3·1 sq.mm.) and bring a certain thickness of that shell to its ignition temperature. It may fail to do so. Let us suppose that the diameter of the heated sphere is doubled; the volume of gases fired is now eight times as large, whilst the surface is now four times as large as before. By increasing the size (or the intensity) of the spark, a point is soon reached at which the combustion produced by the spark evolves enough heat to fire *per se*. the adjacent gas mixture—and the flame is propagated."

* Since the Paper was written Dr. Holm has drawn my attention to a subsequent Paper[8] I had till then overlooked, in which an explanation similar to this was advanced.

6·5 cm², as before, and made to fit over the mouth of the tube discharging the air-gas mixture. The temperature to which the specimen was raised by the flame was a factor of some importance, and each of the 33 specimens was tested both cold and at the steady temperature, at air-gas ratios of 4 : 1 (optimum) and 3 : 1.

Results.

It was hoped that the "safety number" developed by the Miners' Lamp Committee (Memorandum No. 1) would be of use in enabling us to generalize from our individual results

$$S = \frac{\text{distance apart of holes}}{(\text{open area per sq.in.}) \times (\text{area of one hole})}$$

as it had proved a satisfactory means for comparing the wire gauzes investigated by the Committee. However, as will be seen from Table 1 column 9 this expression does not provide a satisfactory guide to the flame-stopping powers of the perforated plates used in our experiments.

We have, therefore, attempted to evolve a more satisfactory formula as follows, based on a suggestion made by Mr. Densham, of these laboratories.

If one considers the two hemispherical flame fronts shown in fig. 2 as emerging from the plate, the *reduction* in the radiation loss caused by the adjacent hemisphere is clearly capable of evaluation. If the flame front is regarded as

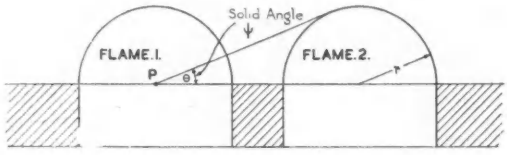


Fig. 2.

opaque this is a very complicated matter, but if one assumes —for purposes of calculation—that it is a transparent radiator the radiation can be regarded as emanating from the centre of the sphere, P.

The solid angle subtended by flame 2 at P can be shown to be

$$\psi = \pi (1 - \text{Cos}\,\theta) = \pi \left(1 - \sqrt{\frac{b^2 - r^2}{b^2}}\right)$$

This is the angle subtended by one hemispherical flame front, but with the usual pattern of perforation there are (fig. 3) six flames surrounding flame 1 at a distance b. Furthermore, there are six in the next circle more remote from this, at a distance $= b\sqrt{3}$ and therefore subtending a solid angle of $\frac{\psi}{3}$. Neglecting flames beyond this, we may therefore put the total solid angle

$$6\psi + 6\,\frac{\psi}{3} = 8\psi$$

therefore the effective radiating area of each flame is reduced in the proportion of

$$\frac{8\psi}{2\pi}$$

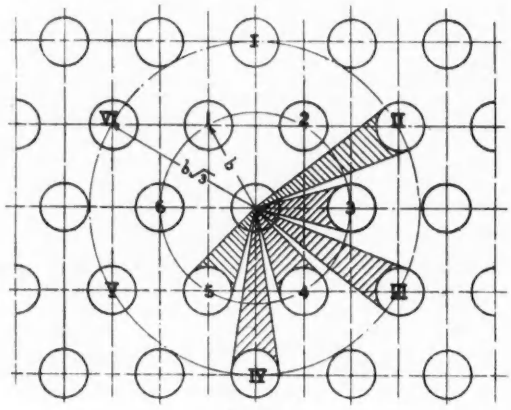


Fig. 3.

TABLE 1.

Ref. No.	Diam. of Holes, Mm.	Open Area. Total Area.	No. of Holes per Sq.Cm.	Thickness, Mm.	Distance Between Centres, Mm.	Temp. ° C. Reached by Sample. 4 : 1	3 : 1	Performance Grade.*	Safety Number †. Miners' Lamp Committee "S."	"S_1."	"S_2."
1	2	3	4	5	6	7		8	9	10	11
1a.. ..	1·2	0·258	21	1·05	2·25	150	100	2	91·4	27	36
2a.. ..	1·5	0·286	16	1·05	2·50	—	130	3	54·4	22	28
3a.. ..	1·56	0·521	26	0·72	2·10	—	—	4	13·9	19	24
4a.. ..	1·48	0·371	21	1·07	2·12	—	—	4	25·6	20	26
5a.. ..	0·51	0·168	71	0·38	1·28	210	—	1	569	79	92
6a.. ..	1·18	0·102	8·7	1·10	4·0	100	—	1	618	40	41
7a.. ..	0·56	0·265	111	0·46	1·1	270	—	1	210	63	79
8a† ..	0·69	0·175	40	1·28	1·48	200	—	1	282	51	63
9a.. ..	1.02	0·265	37	1·15	1·82	270	—	1	93	33	42
10a.. ..	1·02	0·205	26	0·87	2·23	240	—	1	182	37	45
11a.. ..	1·53	0·055	3·1	1·13	6·1	38	—	1	1,140	33	32
12a.. ..	1·02	0·485	56	0·69	1·41	230	—	1	24·6	39	37
13a.. ..	0·74	0·161	37	0·59	1·74	300	—	1	3,660	53	63
14a.. ..	1·46	0·250	14	1·02	2·7	—	—	4	71	23	29
15a.. ..	1·82	0·468	19·4	0·72	2·28	—	—	4	2·1	16	27
16a.. ..	1·18	0·361	29	0·72	1·74	300	150	2	36·5	26	33
17a† ..	0·74	0·232	52	0·82	1·30	300	—	1	41·2	46	58
18a.. ..	—	—	—	0·72	—	230	—	1	—	—	—
19a† ..	0·97	0·266	34	0·72	1·74	290	—	1	97·4	35	44
20a.. ..	0·92	0·389	54	0·66	1·48	230	—	1	553	35	45
21a.. ..	1·59	0·467	26	0·69	2·28	—	—	4	14	18	24
1	1·48	0·495	30	21·8	2·05	380	—	2	14·6	20	25
2	1·38	0·263	18	21 8	2·4	230	—	2	105	24	30
3	1·51	0·246	14	24	2·8	276	—	2	77	20	29
4	2·02	0·539	17	2·4	2·5	—	—	4	6·8	14	17
4b ..	2·02	0·539	17	14	2·5	—	120	3	6·8	14	17
5	2·02	0·417	13·2	24	2·92	—	—	3	15·4	15	19
6	2·02	0·314	9·9	23	3·48	—	—	3	36·6	16	21
7	1·56	0·187	9·9	27	3·40	200	—	2	131	23	30
8	1·54	0·150	8·2	27	4·0	160	—	2	224	26	30
9	1·0	0·269	35	7·3	2·0	—	—	1	124	36	45
10.. ..	1·07	0·447	50	from 25 down to 1·5	1·48	—	—	1	25	28	35
11.. ..	0·90	0·127	20	6·6	2·48	—	—	1	502	46	53

* Performance grade.

† In these three specimens the drillings were not on the triangular pattern shown in fig. 2 but on a 90° pattern.

Grade 1.—Flame will not pass, even with optimum air-gas ratio and at temperature shown in Column 7.

Grade 2.—Flame will only pass with optimum mixture and when hot.

Grade 3.—Flame will pass with optimum mixture whether hot or cold and also when hot at 3 : 1.

Grade 4.—Flame will pass even at 3 : 1 cold.

‡ These "safety numbers" are still in English units. They all have the dimensions of $\frac{1}{8}$ and can accordingly be converted to the metric system by dividing by 2·56.

If one then puts the safety number S_2 (on the basis suggested by Wheeler[7])—(see 1st footnote)

$$= K \frac{\text{effective radiating area}}{\text{volume}}$$

we have

$$S_2 = K \frac{2\pi r^2\left(1 - \frac{8\psi}{2\pi}\right)}{\frac{5}{8}\pi r^3}$$

which, if we substitute the value already found for ψ leads to

$$S_2 = \frac{1}{r}\left(\sqrt{1 - \left(\frac{r}{b}\right)^2} - 0{\cdot}75\right)$$

which for all practicable cases simplifies to

$$S_2 = \frac{1}{r} - \frac{2r}{b^2}$$

Values for this quantity S_2 are shown in Table 1 and are graphed in fig. 4. It will be observed that while the thin plates (shown by the black dots) fall in flame-proofness as

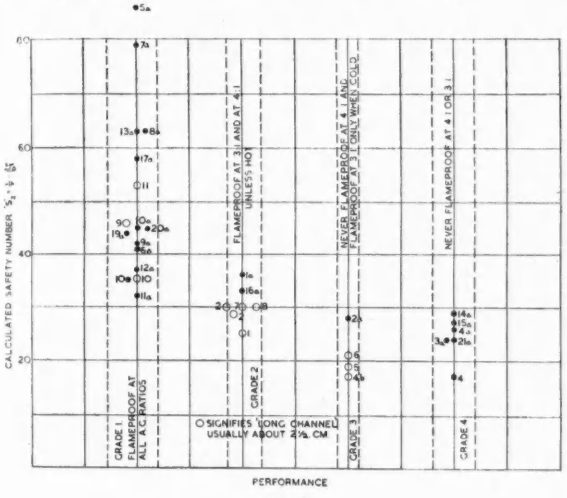

CALCULATED SAFETY NUMBER $S_2 + \frac{1}{r} = \frac{2r}{b^2}$
PERFORMANCE
GRADE 1 FLAMEPROOF AT ALL A.C. RATIOS
FLAMEPROOF AT 3:1 AND AT 4:1 UNLESS NOT
GRADE 2
NEVER FLAMEPROOF AT 4:1 AND FLAMEPROOF AT 3:1 ONLY WHEN COLD
GRADE 3
NEVER FLAMEPROOF AT 4:1 OR 3:1
GRADE 4
○ SIGNIFIES 'LONG CHANNEL' USUALLY ABOUT 2½ CM

Fig. 4.

the safety number falls, there are one or two discrepancies, such as Nos. 12a and 10. The reason for this is revealed in fig. 5 in which the temperature to which the specimens rise has been taken into account. The only reason that Nos. 12a and 10 appeared better than Nos. 1 and 16a was because under the conditions of experiment they did not reach so high a temperature.

Effect of Plate Thickness.

Included in the specimens studied were a number of drilled blocks, usually about 1 in. in thickness, from which the metal

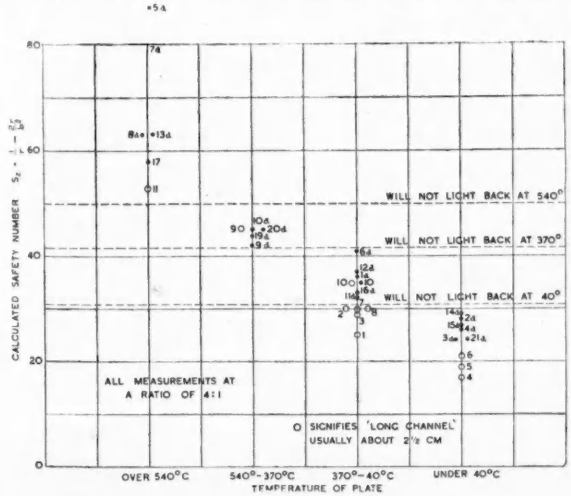

CALCULATED SAFETY NUMBER $S_2 + \frac{1}{r} = \frac{2r}{b^2}$
WILL NOT LIGHT BACK AT 540°
WILL NOT LIGHT BACK AT 370°
WILL NOT LIGHT BACK AT 40°
ALL MEASUREMENTS AT A RATIO OF 4:1
○ SIGNIFIES 'LONG CHANNEL' USUALLY ABOUT 2½ CM
OVER 540°C
540°–370°C
370°–40°C
UNDER 40°C
TEMPERATURE OF PLATE

Fig. 5.

could, if necessary, be progressively removed, so that the effect of this factor could be studied. It will be seen from fig. 4 that as far as Grade 1 (flameproof to optimum mixture) is concerned the length of channel appears to have no effect. The specimens were then tested on a 3: 1 mixture, and, as will be seen from fig. 4 in these circumstances some effect of channel length becomes noticeable. Specimens 4 and 4b, for example, have identical drillings, but the latter (14 mm. thick) is flameproof when cold with a 3: 1 air-gas mixture whereas the former (2 mm. thick) is not.

These results are, qualitatively, in complete agreement with Holm's results for a single hole. However, the block specimens seem to show some advantage even at the ratio of 4: 1 on fig. 5, so that perhaps it would be more correct to say that a perforation pattern which offers a very imperfect resistance to flame is somewhat improved by increasing the thickness of the plate.

Other Possible Formulæ.

Satisfactory results have also been obtained with an empirical formula which was developed at an earlier stage:

$$S_1 = \frac{1}{2r}\sqrt{\frac{b}{2r}}$$

and which at one time seemed to give better results than S_2. If, however, one takes the temperature into account, as has been done in fig. 5 this advantage disappears. It is evident, however, that S_1 cannot be satisfactory at large values of b.

Factors Not Investigated.

While it is hoped that these results will be of interest to the Congress, it will be apparent that the work is not yet quite finished. The only material used for specimens has been brass; and while Holm's work showed that little effect was to be expected from change in material, it will certainly affect the temperature reached by the perforated plate. Some difficulty may be experienced in finding a material which can be used at this high temperature and which can be perforated to the necessary fineness.

Composition of Town Gas.

The gas used was ordinary town gas, made in vertical retorts, and without the addition of carburetted water gas. The calorific value was 4,400 k.cal. per cu.m. (500 B.Th.U. per cu.ft.). The average percentage of hydrogen was 55·5% and other constituents were as follows:

CH_4.	C_2H_6.	CO.	C_nH_m.	CO_2.
20·6	1·0	10·5	2·7	2·5

In conclusion I must express my gratitude to many of my colleagues at Watson House for their assistance in this work, and to the Directors of the Gas Light and Coke Company for permission to publish this Paper.

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Appendix I.

Fig. 6 shows the results obtained for gas of the specified composition graphed in a convenient manner.

If one has to consider holes of 0·05 in. diameter, for example, one finds that if the plate is to be flameproof at room

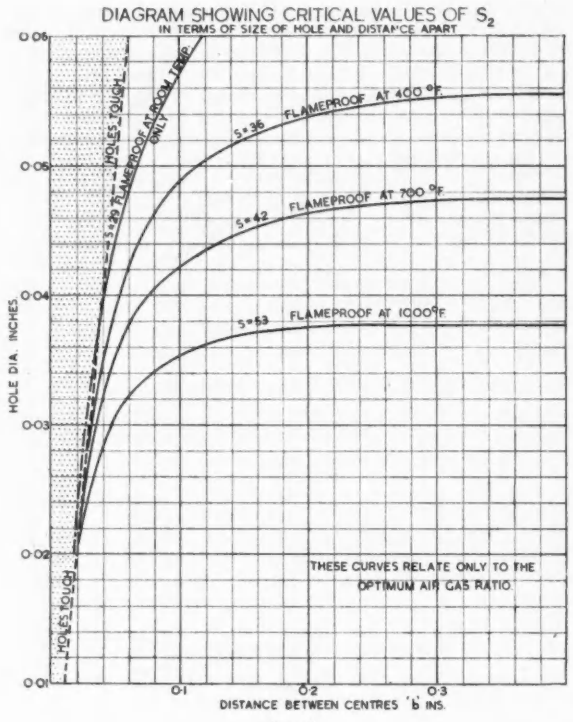


Fig. 6.

temperature the holes must be at least 0·065 in. apart (between centres). To be flameproof at 400° F. they must be at least 0·11 in. apart, but no increase in this figure will make the plate flameproof at 700° F.

Manchester and District Juniors

Visit to Chester

A very successful Ladies' Day was held on Saturday, June 10, when 200 members and their ladies were the guests of the Chester United Gas Company.

The visitors assembled at the Showrooms in Northgate Street, and were welcomed by Mr. Bairstow and Mr. Cullemore, Directors, and Mr. J. H. Noble, Engineer and Manager. Mr. Bairstow said that Kipling once referred to "Sleepy old Chester," but whatever justification there was then for that remark, it certainly did not apply to-day. The Chester Gas Company was a particularly progressive undertaking, and they were at present increasing the carbonizing plant to meet the increasing demand for gas.

The members then left the Showrooms for an inspection of the Roodee Gas-Works. Mr. Cullemore gave a comprehensive survey of the history of Chester, which was much appreciated by the ladies. Along with other guides, he conducted parties over the City, when an opportunity was afforded of inspecting the Castle, Walls, Cathedral, and other places of historical interest. The parties united in the Ambassadors Restaurant, where tea was served at the invitation of the Directors.

After tea, the President (Mr. H. Platt) expressed his personal thanks for the welcome and hospitality which had been extended to the Association. He also expressed his pleasure at the large number present.

Mr. J. Albinson (Senior Vice-President) proposed a vote of thanks to the Directors of the Chester United Gas Company, coupling with it the name of Mr. Noble. He said that Chester was a beautiful City, and comprised many ancient and historic buildings, but in order to preserve those buildings it was essential that smoke should be abolished. The Chester Gas Undertaking by providing both a gaseous and smokeless fuel were making a great contribution towards that end, and it was particularly gratifying to observe the continued increases in gas consumption. Mr. Collinge seconded the vote.

Mr. Cullemore said that it had been a great privilege to entertain the Members of the Association, and he was pleased to learn that they had all had an interesting afternoon. During the last twenty years Mr. Noble had worked very hard, with the result that they now had a particularly efficient undertaking.

The members were then conducted to the River, where they embarked on launches for a trip.

Western Junior Gas Association

Visit to Bournemouth

Some fifty members of the Western Junior Gas Association took part in the Summer Visit to Bournemouth on June 17. On arrival the visitors were welcomed by Mr. P. G. G. Moon (Engineer and General Manager of the Bournemouth Gas and Water Company), who, with members of his staff, conducted them round the Pitwines Gas-Works. The members were particularly fortunate thus to have as their guide one who was largely responsible for the planning of the Works.

At the conclusion of the tour of inspection, the Association were entertained at tea in a marquee on the Works, when Mr. N. S. SMITH (Bristol), the retiring Senior Vice-President, expressed the thanks of the visitors to the Bournemouth Company. The Pitwines Works were, he thought, the finest gas-works he had ever visited, and those members who had travelled long distances to visit them that day had been amply rewarded. He asked Mr. Moon to convey the thanks of the Association to the Chairman and Directors of the Bournemouth Gas and Water Company for their hospitality, concluding with a word of appreciation to the guides who had given up their Saturday afternoon to show them round the Works.

In reply, Mr. MOON voiced his pleasure, as well as that of his staff, in having the Association with them on that occasion. They were delighted to show their Works to Gas Engineers who were young and keen, for it was a pleasure to take people round who were so appreciative of the special points of interest.

As a result of the retirement of Mr. N. S. Smith (Bristol) from the office of Senior Vice-President, the following changes in the list of Officers for the 1939-40 Session were agreed at a Council Meeting of the Western Junior Gas Association:

Senior Vice-President.—K. L. Clark (Weston).
Junior Vice-President.—A. B. Horsfield (Bristol).
Assistant Hon. Secretary.—F. W. Sansom (Exeter).

Mr. Sansom will undertake the bulk of the Secretarial duties during the coming Session, though he cannot be officially appointed Hon. Secretary until the next Annual Meeting. Mr. A. R. Langford (Plymouth) was co-opted to fill the vacancy on the Council.

Scottish Junior Gas Association
(Eastern District)

Annual Outing

The Annual Outing of the Scottish Junior Gas Association (Eastern District) took place on Saturday, June 3, when the members and their ladies visited Hawick. The party of about 40 were welcomed by the President (Mr. Robt. Cowie, Jnr.) and by Mrs. Cowie.

The ladies proceeded by 'bus to the Wilton Lodge Park where a most enjoyable hour was spent, while the members visited the gas-works. The two parties met again at the Crown Hotel where they were the guests of the Hawick Gas Company at lunch.

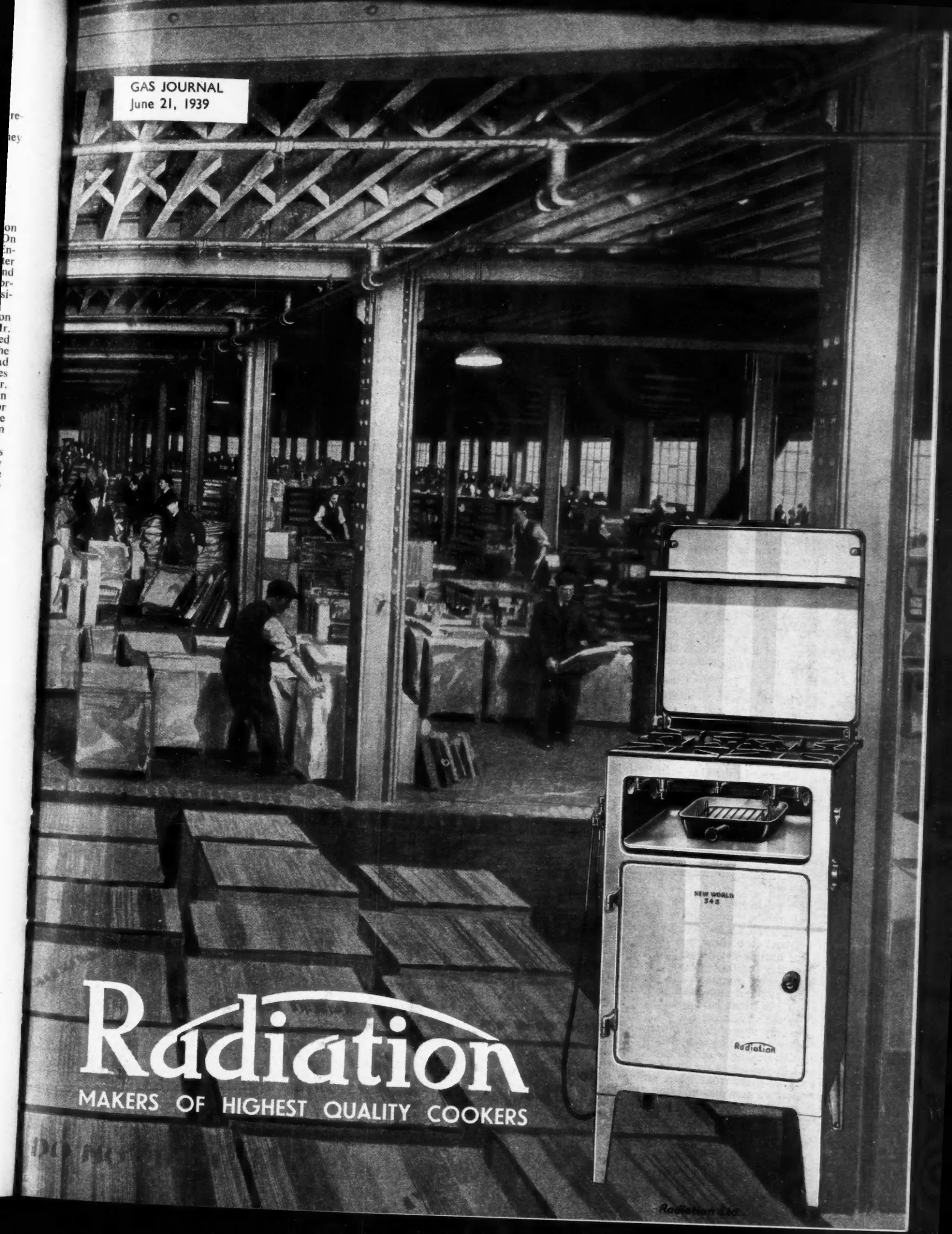
Mr. T. H. Armstrong (Secretary of the Company) presided and welcomed the guests on behalf of the Company. He hoped that both parties had enjoyed the morning and was sure that they would have a very pleasant time in the afternoon. Mr. Robt. Cowie, Jnr., briefly replied on behalf of the Association. He then called on his father to say a few words.

Mr. Cowie also extended a welcome to the visitors and said that they had been granted ideal weather for their visit to Hawick. While business would not permit of his joining them on their 'bus tour in the afternoon, he was certain that they would thoroughly enjoy themselves.

After lunch the party were driven by way of Abbotsford, Melrose Abbey, Dryburgh Abbey, and St. Boswells. At Abbotsford the party were conducted round the mansion which was the first private house to be lit with gas in Scotland. A group photograph was taken on the site of the gas-works, the only remains of which are two metal retorts which have been removed to the back of the house.

A stop was made at Dryburgh Hotel for tea. Mr. C. D. Blackhall (Edinburgh), on behalf of the members and friends, called for a vote of thanks to Mr. and Mrs. Cowie for the very enjoyable day which they had arranged for them. Mr. and Mrs. Cowie briefly replied.

GAS JOURNAL
June 21, 1939



The Gas Industry, the Grid, and the Diesel Engine

By "Saint Lorenzo"*

An objective appraisal of the Grid unquestionably leads the layman to the conclusion that (1) the concentration of power in large interconnected generating stations has certainly not made for security, (2) the misdirection of the greater part of the heat in the coal up the chimney stacks and into rivers and canals is a desperately expensive business, and (3) the miscellany of tariffs in force outrages common sense, and but for a naturally "rising market," which has persisted for years, would have ruined the Industry.

All indications go to show, however, that the Gas Industry, on the other hand, (1) has an excellent record of reliability, (2) knows how to handle coal with specialized skill leading to high efficiency.

The question whether electricity is rendering an effective public service commensurate with its excessively high cost is really justifiable and by no means irrelevant at this juncture.

A fairly good rough and ready index of the economic efficiency of the manufacture of gas, the generation of electricity in the C.E.B. steam power stations, and the production of both electricity and heat in independent diesel engine plants, is the fuel cost per therm of energy output.

Full data relating to gas undertakings are to be found in "Field's Analysis" and the "GAS JOURNAL" Calendar, the national production of electricity is reviewed in detail in the Statistical Tables of the Electricity Commission, while a record of the consistently successful working of diesel engines in this country and overseas is given in the returns of the DEVA.

To take a concrete instance, it is of interest to consider the beneficial use to which one ton of coal (or its equivalent in fuel oil) is put in each case.

Gas Industry.

The efficiency of utilization of the raw fuel, using the amount of gas and of saleable coke made per ton of coal carbonized as a criterion, may be said to be, in round figures, 75%. About 20% to 25% of the potential heat in the coal reappears in the form of gas and 50% to 55% as coke and coke breeze.

Whereas in the Gas Industry it is coke that is consumed to heat the retorts, the coke ovens manufacturing metallurgical coke use a large part of the gas, which is regarded as the by-product, for this purpose.

TABLE 1.

Year 1936–37.	Gas Companies. Per Ton of Coal.	Local Authorities. Per Ton of Coal.
Coke made	12·43	12·91
Coke used for fuel	2·53	3·00
Coke made for sale	9·90	9·91

In 1934 the average gas production in coke ovens per ton of coal carbonized was 10,790 cu.ft., of which 60% was used for heating the ovens, 22·7% for other purposes by the oven owners for raising steam or in steel works where the ovens are under common management, 10% was sold to gas-works, 5% to other undertakings; leaving 2½% unaccounted for.

Coke ovens have been used, to quite a considerable extent on the Continent, for gas-works carbonization. The system is only appropriate for large-scale works as the cost of the power-operating equipment is too heavy a burden for installations dealing with less than 250 tons of coal per day.

In gas-works the sources of waste heat recovery are in the waste gases from retort settings (approximately 40% of the heat of combustion being available after carbonization and regeneration), in blow gases from water gas plants, and in the sensible heat in the hot coke. The control and use of waste heat is the object of a concentrated attention, that is impressive, in gas-works.

The temperature of the exhaust gases in vertical retort settings is between 650° C. and 850° C. with from 50% to 150% excess air. In the case of horizontal settings the temperature is from 450° C. to 700° C. and the excess air from 100% to 150%.

There are numerous gas-works in which the whole of the steam requirements for works services is generated in waste heat boilers working in conjunction with either vertical or horizontal retort settings. In water gas installations enough steam, it is stated, can be obtained by waste heat recovery to provide fully for the steam needed by the plant. A waste heat boiler applied to the coke quenching process can be made to yield 900 lb. to 950 lb. of steam per ton of coke cooled.

One average ton of coal treated in a modern gas-works is usually said to be capable of furnishing, *inter alia*:

TABLE 2.

Item.	Approximate Therms per Ton of Coal.
Say, 13,840 cu.ft. of gas	69·20
About 10½ cwt. of coke at, say, 13,140 B.Th.U. per lb. ..	154·5
Approximately 136 lb. of coke breeze at, say, 11,000 B.Th.U. per lb.	14·96
	238·66

Assuming 14,000 B.Th.U. per lb. of coal this represents an efficiency of utilization of the coal of about 76%. In addition to the above some 10½ gallons of tar and 2¼ gallons of rectified benzole are produced. Perhaps a further 7% may be added to the thermal efficiency mentioned on account of by-products other than coke and breeze.

The approximate manufacturing cost of gas per ton of coal carbonized was a little over 3d. per therm in 1936 and a little under 3d. per therm in 1937.

TABLE 3.

Item.	d. per Therm Sold.	Expressed as d. per kWh Sold.
Net cost of coal and oil	1·300	0·045
Salaries	0·151	0·005
Wages	0·363	0·012
Purification	0·084	0·002
Wear and tear of plant	1·138	0·039
Manufacturing cost ..	3·036	0·103

Expressing these costs in therms and in kWh is not mere abstract arithmetical juggling. It is necessary in order to make a comparison later with electricity.

This is, beyond question, a high level of achievement in efficient carbonization, which reflects the greatest credit on gas-works engineers and chemists.

The Grid.

Probably the highest thermal efficiency recently attained in the largest steam power houses operated under the control of the C.E.B. corresponds to a coal consumption of 0·89 lb. per kWh generated or, say, 29·25%. This corresponds to about 24·5% thermal efficiency per kWh sold, however.

The electricity supply industry wastes approximately the same amount of potential heat in the coal that is actually put to beneficial use by the Gas Industry. Even at a thermal efficiency of 24·5% the cost of fuel alone per kWh sold is in the neighbourhood of 0·105d. or 3·08d. per therm.

The overall thermal efficiency of the Grid generating sys-

* In adopting this *nom de plume* the Author reminds us that Saint Lorenzo was roasted alive on a grid.

A.R.P.

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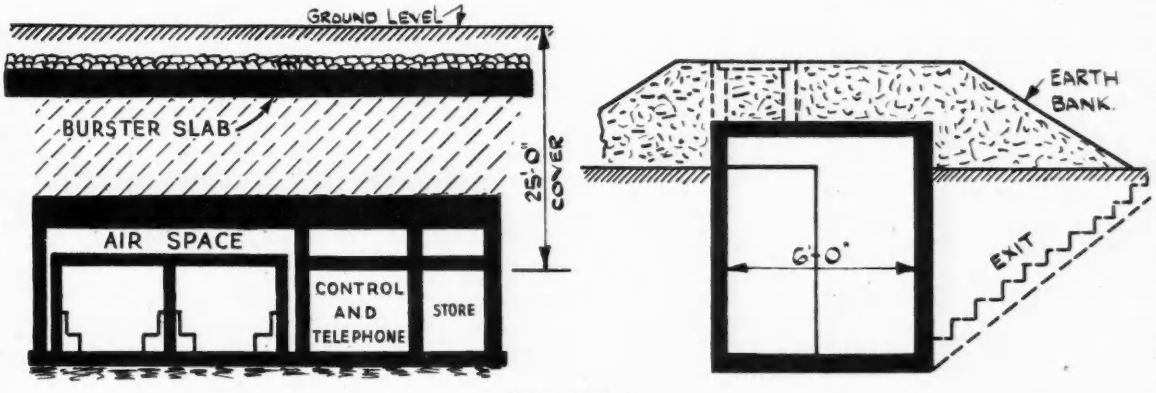

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tem on the basis of kWh sold is, in all probability, of the order of 17½%.

The general cost of the generation of electricity per unit or kWh sold in 1938 is given below:

TABLE 4.

Item.	d. per kWh Sold.	Expressed as d. per Therm Sold.
Fuel	0·163	4·78
Salaries and wages	0·027	0·79
Repairs and maintenance, oil, stores, &c.	0·028	0·82
Generation of electricity	0·218	6·39
Energy purchased	0·017	0·50
Totals	0·235	6·89

Reference to Table 3 will show that electricity is twice as costly to produce, per therm, as gas. Many consumers of electricity realize unconsciously the significance of this fact.

The figure of 0·163d. per kWh sold with coal at 18s. 6d. per ton equals 1,360 kWh or 46·5 therms sold per ton of coal burned.

The Diesel Engine.

If 1 ton of average coal is assumed to contain 291·2 therms (13,000 B.Th.U. per lb.), then 0·702 tons of fuel oil (at 18,500 B.Th.U. per lb. net calorific value) is its equivalent in potential heat.

The fuel consumption of a 4-stroke cycle diesel engine, over a wide range of its rated loading, should not exceed, with keen operating supervision, 0·55 lb. per kWh generated.

Under these conditions 0·702 ton of oil (or 1,572½ lb.) should be sufficient to run a 350 h.p. diesel set for 16·875 hours, generating 2,870 kWh (987·75 therms) and furnishing in addition from the cylinder jacket circulating water and exhaust gases 1,214·9 therms, making a total of 2,193·75 therms. This performance corresponds to 75% thermal efficiency.

The cost of 16·875 running hours is given below:

TABLE 5.

Item.	£.	d. per Therm.
Fuel at ¾d per lb., including tax (3s. 10½d. per hr.)	3·275	3·60
Wages (£365 per annum)	1·792	1·96
Oil and stores	0·316	0·34
Repairs and maintenance	0·492	0·55
Diesel engine total	5·875	6·45

It is more equitable to subdivide the total cost into "Heat" and "Electricity."

TABLE 6.

Item.	Heat.		Electricity.	
	£.	d. per Therm.	£.	d. per kWh.
Fuel	1·310	2·59	1·965	0·164
Wages, oil and stores, repairs and maintenance	0·650	1·28	1·950	0·163
Total	1·960	3·87	3·915	0·327

When gas can be purchased at approximatcly 3d. per therm an engine, using gas as the principal and oil as the "pilot" fuel, may be worked very economically.

Conclusion.

Power should be given in peace time to a Fuel Controller, to whom the common citizen could look for the exercise of plain common sense in connexion with the exercise of planned economy in the use of 181·79 million tons of coal and the 2,614·6 million gallons of motor spirit, kerosene, and fuel oil annually in this country.

	Million Gallons.
Motor spirit	1,364·0
Other spirit	27·8
Kerosene	222·6
Gas oil	151·0
Fuel and diesel oil	849·2
Total	2,614·6

Consumed annually in this country for different purposes. The suggestion is not argumentatively weak.

A comparison between the cost per therm sold and per kWh sold by the gas and electricity supply undertakings may help to make clear the nature of the issue between the two industries. That the problem is not merely one of production or generation may come as a surprise to many.

TABLE 7.

Item.	Gas.		National Electricity.		Diesel Engine.	
	d. per Therm Sold.	Expressed as d. per kWh Sold.	d. per kWh Sold.	Expressed as d. per Therm Sold.	Heat. d. per Therm.	Electricity d. per kWh.
Manufacture or generation	2·960	0·101	0·235	6·890	3·87	0·327
Distribution	2·449	0·084	0·151	4·424	(say 0·38	0·033)
Management	0·466	0·016	0·124	3·633		
Miscellaneous	0·991	0·034	0·104	3·047		
Total expenses	6·866	0·235	0·614	17·994	4·25	0·360
Interest and depreciation					(say 0·75	0·153)
Total					(say 5·00	0·513)

The average revenue obtained from various sources can be contrasted in a similar manner. While the C.E.B. has done good work in reducing materially of recent years the consumption of coal per kWh generated, this must not be allowed to obscure the fact that the organizational powers of the distributors of electricity are decidedly inferior to those of the Gas Industry.

TABLE 8.

Item.	Gas.		National Electricity.	
	d. per Therm Sold.	Expressed as d. for kWh Sold.	d. per kWh Sold.	Expressed as d. per Therm Sold.
				s. d.
Average revenue from lighting, heating, and cooking	say 9·0	0·307	1·693	4 1½
Power	say 4·0	0·136	0·643	1 6½
Public lighting	—	—	1·063	2 7
Traction	—	—	0·585	1 5
Revenue from sale of gas or electricity	7·687	0·262	1·047	2 6½
Revenue from rentals and other sources	1·427	0·049	0·098	0 2½
Total revenue	9·114	0·311	1·145	2 9¼
Gross surplus	2·248	—	—	1 3¼
Capital outlay per therm	say 2/8½	—	—	about 18/6
% interest on capital outlay	7%	—	—	6·875%

Would the nation be at a hopeless economic disadvantage without the Grid? The high efficiency of utilization of fuel in comparatively small independent generating installations proves that mere size has little relation to efficiency. The data are not given in order to present a special or unusual view.

It is becoming more plain each year that there should be a common control of gas and electricity. The two industries are inextricably bound together in the practical exploitation of coal, for the distribution of light, heat, and power. It is paradoxical that gas and electricity, seeking the same ends, are at cross purposes. It is also a substantial certainty that the skill and knowledge of gas engineers and chemists could produce electricity much more economically than the most expert electricians. The moral is overwhelmingly clear. In the interests of efficiency and economy alike let them have the coal to do work of a useful nature. Such a course might be followed with national advantage.

Manchester District Association of Gas Engineers

A meeting of the Manchester District Association of Gas Engineers will be held in Huddersfield on Friday, June 30, under the Presidency of Mr. H. Singleton, M.I.Mech.E., Engineer and Manager of the Hudderfield Gas Department. In the morning, members will visit the works of Messrs. Hopkinsons, Ltd., after which luncheon will be served in the Town Hall by courtesy of the Mayor of Huddersfield (Alderman F. Lawton, J.P.) and at invitation of the Chairman and Members of the Huddersfield Gas Committee. After luncheon, members will visit the Gas-Works, inspecting the gas-fired heating and ventilation installation at the new Technical College *en route*, and later proceed to the works of Messrs. W. C. Holmes & Co., Ltd., where tea will be provided.

The Public Lighting Load

A SURVEY by W. J. LIBERTY

NO apology is needed for bringing this matter once more into the open, for the question of public lighting in connexion with the Gas Industry is more than academic; it is of the most vital importance to it, for by its continuance before the public, showing what can be accomplished by modern lighting appliances and their scientific application a permanent public advertisement is secured for gas.

The continual shrinkage of the domestic gas lighting load, attributable chiefly to the remedying of overcrowding, slum clearances, and rehousing. Fewer dwellings per acre (say 12) are erected, which houses are, in many cases, wired for electric lighting by the rating authority that provides them. This tends to tilt the scales unfairly against the Gas Industry.

It has been said by some in the Gas Industry that the public lighting load is negligible, or that it is unprofitable, and with a shrug of the shoulders they would let it go. But is it negligible? If we examine the matter carefully, facts dispute that contention. On analysis it is found, taking at random some 100 public authorities having public lighting under their control and being answerable for an aggregate of 11,817 miles of lighted thoroughfare, that no less than 7,371 miles are gas lighted, the remaining 4,842 being electrically lighted. The number of public lamps in these (roughly) 12,000 miles of road is 472,102, of which nearly 300,000 are gas lighted. Surely no mean load to be despised.

It is noticed from reliable returns furnished that the number of public electric lamps show an annual increase; this is chiefly caused by the displacing of gas lamps in the main roads, while, paradoxical as it may seem, public gas lamps also show an annual increase. The electric increase is largely due to the extended use of the mercury vapour and sodium discharge lamps for highway lighting. The increase in public gas lighting is due to (*a*) the development of local housing schemes with the accompaniment of additional roads; (*b*) to the opening up of private estates for building and layout; (*c*) improved existing public lighting and additional lighting, following the issue of the Report of the Ministry of Transport recommending a higher standard of existing lighting; (*d*) the extension of mains to villages and townships, largely brought about by the amalgamation and grouping of companies which is now proceeding, by which thoroughfares hitherto non-illuminated are now being lighted; (*e*) the distribution of more efficient appliances consuming less gas.

The Extent of the Load.

For the information of those who shrug their shoulders and to obtain some idea of what public lighting means in annual output to meet this demand, it is perhaps news to some to learn that the Industry sends out an annual aggregate quantity for these limited areas above mentioned, of no less than 5,086,601,194 cu.ft. To mention but ten cities in this group, the annual output of gas for public lighting is as follows:

	Cu.ft.
Birmingham	825,718,439
Manchester	491,970,144
Leeds	392,880,000
Glasgow	277,284,055
Sheffield	265,585,989
Edinburgh	188,592,467
Liverpool	183,987,144
Newcastle	170,579 600
Nottingham	154,982,347
Hull	146,704,000

The total number of public lighting employees in the first group is no fewer than 4,896, of which Glasgow and Birmingham have 1,145 and 450 respectively, while the Gas Light and Coke Company, in an area covering 546 miles and dealing with 100 municipal authorities, has 52,430 public lamps with a total annual output of gas for this purpose of 1,106 million cu.ft. and employs a public lighting staff of 500.

The above figures give an idea of the value of the public lighting load to the Industry; yet there is still much ground to possess, for in the municipal areas quoted, apart from county roads, there are still 400 miles of unlighted roads. This, however, is a negligible quantity compared with the miles of unlighted highways under the control of the County Councils, which include the trunk roads used by the enormous mechanized traffic, many of which under the Ministry of Transport may eventually be wholly or partially "restricted" under the Road Act.

In England alone (omitting the areas of the London County Council and the Metropolitan Boroughs) there are 131,815 miles of roads classed and unclassed. On April 1, 1937, the Minister of Transport assumed full responsibility for the trunk roads of the country and under the Trunk Roads Act, 1936, took over some 4,500 miles of trunk roads on the main through routes. True, this is but a small fraction (2½%) of the 176,000 miles of roads to be taken from the control of local authorities and handed over to a single authority. The 178,000 miles of thoroughfares, of course, include all the smaller roads and streets in the urban areas

An obvious sequel of the transfer of these trunk roads is that highway illumination will be discussed afresh, for special importance attaches to Section 6 of the Trunk Roads Act, which gives the Minister power to enter into and carry out arrangements for the supply of trunk road street lighting where it does not exist, or for the improvement of the existing street lighting where it is not adequate. Sir Charles Bressey has admitted that the general standard of illumination in this country is "deplorably low," although in some cases, it has been stated, we could show some of the finest installations in the world; but more attention must be given to districts remote if the toll of road accidents by night (the cause of which is chiefly inefficient lighting) is to be reduced. It is stated that Great Britain is ahead of the United States in the matter of street lighting. We may lose that proud position if we maintain the standards to which we have attained on some of our traffic roads.

The above facts, together with the subsequent Report of the Ministry dealing with the lighting of these roads and the recommendations for them, should mean a big stride in their lighting or the raising of the standard of the illumination existing, especially if the Minister decides to make a grant in aid on condition that the lighting conforms to the standard recommended. The Minister of Health is now prepared to sanction loans to local authorities for public lighting subject to the approval of the Minister of Transport as to the standard set out in his report.

Business to be Gained.

This, taken in conjunction with the Ministry's determination to raise the standard of existing lighting and to fix it for future installations, should, and no doubt will, cause local authorities throughout the country to overhaul their public lighting and lighting departments and set about appointing an officer whose specific and sole duty would be to advise as to the efficient public lighting and its control in their areas, as recommended. This should mean big business for those who supply the source of illumination, and for the manufacturers of lighting equipment. Those who are out for the business will obtain it.

In a number of districts, gas departments in their half-yearly reports in 1938, show decreases in their domestic load, but point to increases in the use of gas for public lamps. For instance, Stalybridge Gas Department states: "The quantity of gas used in the public lamps continues to increase, so does industrial consumption, on the other hand, the domestic consumption decreased by nearly 9 million cu.ft., following a decrease during the year to March, 1937, of 12 millions. During the past twelve months 100 consumers have been lost." Mr. R. S. Restall, the Engineer and Manager, reports on the reduction in domestic consumption, and remarks: "The most serious aspect of slum clearance is the loss of gas consumption." This confirms the statement in the opening of this article. Then the Sowerby Bridge Gas Department, reporting a decrease in output of 1·54% for the year under review and a decrease of 182 in ordinary consumers, speaks hopefully of public lighting: "Conversion of the street lamps from hand lighting to clock control has resulted in considerable saving in labour and gas, while the number of mantles used decreased by approximately 40%." Thus we have a picture of a live Gas Department putting its weight on the public lighting side as a counter to the domestic side which has been hard hit by adverse circumstances.

In a Paper on "Public Lighting by Gas in Small Towns" before the Meeting of the A.P.L.E. at Bournemouth last September by Mr. W. Hodkinson, of the United Kingdom Gas Corporation, which controls 66 gas undertakings, stated, that having decided upon the merits of a street lighting installation, the Corporation adopted the practice of offering to provide and erect free of charge and without obligation demonstration installations of not less than 6 lamps, in the road or roads to be lighted. From their experience to date, Mr. Hodkinson stated that they "are quite satisfied that this is the only effective method of indicating to the authority concerned what results they will obtain from any particular type of installation." In this brief paragraph lies in a nutshell the method to be adopted not only in small towns but by all local authorities responsible for public lighting. If the local authorities cannot come to conferences and see exhibitions, let the local gas undertaking show them in miniature the installation at their own doors. There they can see the results that can be obtained.

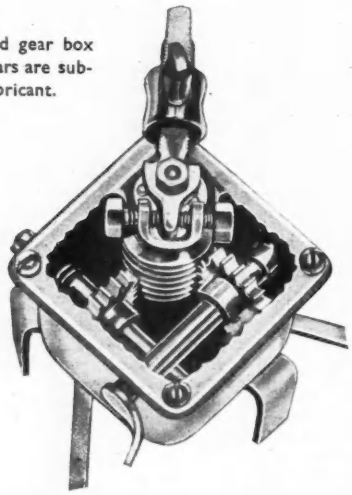
Gas for public lighting service is still a sound proposition. For the Industry to profit by the load, it has to be remembered that the race is to the swift.

Notable Advances in Meter Manufacture

A "JOURNAL" representative looks in at the Kennington and Streatham Vale Works of Smith Meters, Ltd.

AGAINST a background of commendable efficiency, coupled with the use of the latest precision machinery and plant—characteristics that the Gas Industry has come to take for granted—there are outstanding features that impress the visitor to the Kennington and Streatham Vale Works—namely, that simplicity, strength, reliability, and accuracy are the primary considerations in all productions.

Outstanding features are the "Du-Slot" prepayment attachment, of which we learn that considerably more than a million are now in use; the rental meter which, while delivering gas at a basic rate, collects separately all meter and other rentals and hire-purchase charges; the direct reading index, now being fitted as ordered, and to all hotel gas fire meters; and the original totally enclosed and lubricated gear box.



Totally enclosed gear box in which all gears are submerged in lubricant.

Much might be written about the whole process of meter production as practised in 1939 at this modern works—the careful selection of all materials, the care with which every component is tested and inspected at every stage of assembly, and the exactitude of the testing of the finished meters; but it must suffice to take a glimpse at the main features mentioned. All meter parts, "Du-Slot" attachments, indices, &c., are made at the Streatham Vale factory and assembled at the Kennington Works. In all productions from the tool-making department, equipped with a machine designed to lay-out any drilling or machining operation and giving an accuracy to within 1-10,000th part of an inch limit to the dispatch department, the works are self-contained in that they make their own tools, gauges, and jigs, print their own index dials and other plates, apply anti-rusting processes, make every component, and conduct their own experimental and testing departments. Tests of materials for duration of life and destruction under working conditions go on continuously.

For the "Du-Slot" mechanism exhaustive tests are constantly made before selecting the most suitable materials. All the components are machined with precision-to-limit gauges, most of which have a tolerance of not more than 1,000th of an inch "up or down," making all parts interchangeable. The gear wheels have teeth accurately cut and perfectly shaped on the latest type machinery and 100% of all components—not mere samples—are examined by a specially trained staff before passing into store. In the assembly, tools and jigs are provided to ensure that each individual operation is correctly performed.

A Flow System.

A flow system, preferable in the circumstances to continuous conveying, is in operation, allowing every operator sufficient time to complete the process step by step, and each assembled mechanism is examined by skilled examiners. Not a single soldering operation is used on the mechanisms. From the insertion of the coin at the front, in which no thumbing is required, to the rear of the mechanism which, by special patented maltese cross, positively closes and opens the valve, every working part is robustly constructed to function correctly. Highest quality stainless steel is incorporated—even stainless steel ball thrusts at all frictional points. In its early days the type of mechanism having two separate coin slots met with some criticism, but the fact that the number now in use is over 1,050,000 is proof that its merits have triumphed.

The section producing gear boxes is noteworthy for its spotless cleanliness and attention to minutest detail. The gear box is filled with a permanent grease of special viscosity, which when in operation has a dual function of lubricating and protecting the gears. The gears themselves are machined with the correct rake, and bearings and shafts are bushed with non-corrosive metals having suitable tolerances. An interesting item is the ball-thrust in the gear box to eliminate all possibility of friction and wear.

A Direct-Reading Index.

It is strange that the "Direct-Reading Index" has not been more universally adopted in place of the more usual dials. Smith Meters have concentrated upon producing the numeral index, and the same high standard of accuracy is achieved in the production of these new direct-reading indices, which give a clear positive reading in numerals of hundreds, thousands, &c. The polished stainless steel spindles and the improved method of fixing them are of note, and other points about the device are the reduction of friction and corrosion by reducing the moving parts to a tenth of the former type of movement, also the improved housing which is more compact on the front of the meter.

The new rental meter is in a sense an advance on the "Du-Slot" mechanism. A variable plate provides a simple adjustment for rentals and other charges ranging from 2d. to 14s. per week. Rentals may be paid daily or at the consumer's convenience, either in cash payment or reduction in gas charge after rental is cancelled out, and, as the rental is collected on the gas-consumed mechanism, the tariff may be optional, the gas not being cut off if the consumer has failed to pay his rental charges.

At the Kennington Works, a very modern factory with excellent lighting and working conditions, meters, ordinary and "Du-Slot," are produced of varying capacity from the 0·5 cu.ft. per hour gas fire meter up to 12,000 or more cu.ft. per hour for industrial purposes. It is interesting to note the grading of Cookley "K" tin-plate, leathers, and components in accordance with the size of these meters, each item being considered to the last stress and strain point combined with gasways for a maximum gas flow, conducive to accuracy in registration and low-pressure absorption.

Direct-Reading Meter Index.

An impressive feature is the range of tests constantly being carried out. A high-speed endurance test imposes upon meters the equivalent of several years' life in a single month. Meter leathers undergo a more severe trial than they are ever likely to encounter in actual use; these tests run continuously. In the test room there are thirty test holders ranging from three to twenty cu.ft. capacity; meters are subjected to tests for endurance, speed, wear, registration, and general efficiency.

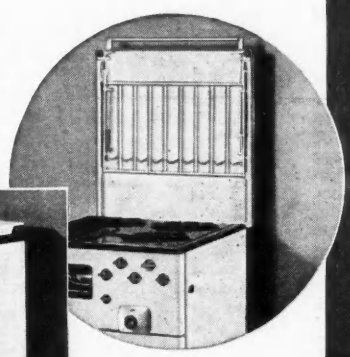
Like many other manufacturers who serve the Gas Industry, the Company is also a substantial industrial gas consumer, gas being used in every possible heating process and also for lighting.

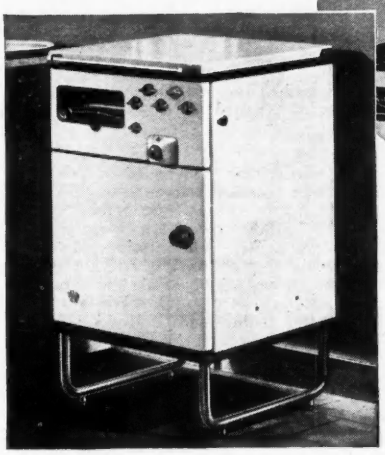
VARIETY

"Heading the bill" is the 57 "Cabinet" Cooker with the "P.R." Hot-Closet. This "double act" presents an attraction which will appeal to all. Other "features" are the well-known Main Plate Racks and Backplates, and also the Hinged Cover. The latter has already met with a "great reception," especially when "teamed" with the ingenious Folding Chromium-plated Plate Rack. This, opened for use, is absolutely rigid and yet it folds back into the cover with ease.
Another attraction of the Hinged Cover is the novel locking device.

The illustrations from left to right show :—

1. The 57 Cooker with tubular legs and Hinged Cover closed.
2. The Hinged Cover open, with chromium Plate Rack folded down.
3. The 57 Cooker with cast iron legs and the "P.R." Hot-Closet.





No. MAIN 57

"CABINET" GAS COOKER

In Ivory & Black or White & Black Deluxe Mainamel

★★★★R. & A. MAIN LTD. LONDON AND FALKIRK★★★★

Gas Undertakings' Results

Arbroath.

In his report to Arbroath Town Council on June 12 of the Gas Department for the year ended May 15, Mr. David Morton, Engineer and Manager, stated that the financial position at that date showed a debit balance of £3,437, as against £5,856 for the previous year, after meeting various items in the appropriation account. The net income received from residuals amounted to £5,711. The total quantity of coals carbonized was 12,800 tons, and the total quantity of gas made amounted to 225,985,000 cu.ft.

Bideford.

In their report for the year ended March 31, the Directors of the Bideford Gas and Coke Company, Ltd., state that the profit is £6,035, which, added to the amount brought forward of £1,683, makes a total of £7,718. The profit for the preceding twelve months was £5,774, and the amount brought forward was £1,835, giving a total of £7,609. The dividends for the year are the same, at 14½% on the original shares and 11½% on the additional shares, which will leave £1,687 to be carried forward to next year's account. The total quantity of gas sold during the past twelve months was 690,725 therms, which compares with 686,197 therms in the previous year.

Buckhaven and Leven.

Another record year is reported by Mr. H. A. Aitken, General Manager, in his annual report to the Buckhaven and Leven Gas Commissioners. Gas made amounted to 182,663,000 cu.ft. Ordinary meters consumed 25,442,200 cu.ft.; prepayment meters, 133,140,100 cu.ft.; a total of 158,582,300 cu.ft. Public lighting used 7,698,200 cu.ft. and gas used in works totalled 2,079,900 cu.ft. Gas unaccounted-for was 14,302,600 cu.ft., 7·28% of the total gas made. Coal carbonized totalled 11,110 tons. There were 4,257 tons of coke produced, and 227,423 gallons of tar. The number of consumers is 8,360, 1,310 ordinary meter and 7,050 prepayment meter. There are 3,779 cookers and 671 grills and hotplates are on hire. Thirty-nine cookers were sold, and 253 are on hire-purchase, while 91 other appliances were sold, and 68 are on hire-purchase. Average consumption per consumer was 18,969 cu.ft. Mr. Aitken stated that the statistics of the year ended May 15 last showed a continuance of the progressive improvement of previous years and again provided a record achievement in the history of the Undertaking. With the installation of the Connersville Station Meter in 1937 an accurate record of the gas made during the past year had been obtained. The quantity of gas sold during the past year totalled 168 million cu.ft., or over 3 million cu.ft. in excess of the gas sold during the preceding year, constituting a record output.

Carlisle.

The quantity of gas sold in the twelve months ended March 31 last by the Carlisle Corporation was 644,480,000 cu.ft., which compares with 655,211,800 cu.ft. in the preceding year. The number of consumers increased by about 300, the gain being entirely upon the slot meter side of the business. The total at March 31 last was 20,601, of whom 4,937 use ordinary meters. There is a net profit on the past year's working of £998, as against £1,443 for the preceding twelve months. At the date to which the accounts are made up, the number of cookers out was 19,042, being an increase over the twelve months of 1,018. An electrostatic detarrer has been in operation throughout the financial year, and has resulted in a considerable reduction in purification costs.

Darwen.

For the past financial year the Borough of Darwen Gas Department show a net profit of £2,550—the falling off of £1,754 as compared with the preceding twelve months being more than accounted for by the increase in cost of coal and in income-tax payments. A still further increase in the price of coal will have to be faced during the present year. Already, since 1935, the cost per ton has gone up from 21s. 2·3d. per ton to 25s. 6·71d. per ton. The present carbonizing plant continues to give good results; and the final words have now been said with regard to the old Munich Chamber plant, which has been completely demolished—the scrap ironwork being sold and credited to the Reserve Fund. Thousands of good bricks were salvaged, and are now stored away, while the waste was carted away for foundation work on local munition factories. &c. The quantity of gas sent out during the twelve months was 205,192,000 cu.ft., an increase on the year of 3·59%. The unaccounted-for gas has been brought down to slightly over 5%, there being, in effect, an increase of 11,813,500 cu.ft. in the quantity of gas sold. The average price received for gas was 38·59d. per 1,000 cu.ft., as compared with 40·41d. for the previous year. Nearly the whole of the increase in gas sales was through ordinary meters. The Corporation's stock of coke was exhausted during March, and to keep customers supplied nearly 100 tons had to be purchased from outside sources.

Grangemouth.

The satisfactory condition of the Grangemouth Gas Undertaking was commented upon by Bailie Peddie, when submitting his statement at the meeting of the Gas Commissioners. The Convener stated that they had sent out 99 million cu.ft. of gas, this being an increase of 7½ million cu.ft. for the year. A new gasholder of ½ million cu.ft. capacity had been erected. New mains had been laid, and in spite of considerable increases in the cost of coal and a slight falling off in the price obtainable from by-products, they were able, after meeting all expenditure, to show a profit of £864.

Guernsey.

A satisfactory increase in business for the year to March 31 last is reported by the Directors of the Guernsey Gas Light Company, Ltd. The sale of gas during the year was 256,726,300 cu.ft., which is an increase of 12,246,200 cu.ft. over the sales of the preceding twelve months; while the number of consumers increased by 363, making the total at the end of March 9,438. An addition during the year of 3¼ miles to the mains laid (making the total length 85¼ miles) has brought to an end the Company's main extension programme; and the Directors remark that, unless building developments take place in areas which would at present be unremunerative, they do not contemplate any large extension of mains during the present year. The dividend is repeated at 4½% for the year. This will leave a balance of £20,775, which, "having regard to the increased cost of materials and the very unsettled international outlook," the Directors have decided to carry forward. The amount carried forward twelve months ago was £18,961.

Primitiva Holdings.

The net profit of Primitiva Holdings, Ltd., for the year ended April 30 last amounts to £81,021, to which has to be added the balance brought forward of £123,286, making a total of £204,307. For the year to April, 1938, the profit was £80,828, the sum brought forward was £123,843, and the total £204,671. The dividend on the ordinary stock is repeated at 3½%, and £10,000 is again allocated to general reserve. The balance to be carried forward will then be increased a few pounds to £123,296. The dividend received from the Primitiva Gas Company of Buenos Aires, Ltd., was the same as last year at 2¼%, free of income-tax. The Gas and Naphtha Committee of the Buenos Aires Deliberative Council has approached the Primitiva Gas Company regarding the terms on which the Company will operate after the expiry of the present municipal contract in 1940. Negotiations are proceeding with a view to finding a solution satisfactory to all concerned.

Southwell.

The Directors of the Southwell District Gas Company report a profit of £395 for the year to March 31, 1939, which with the balance brought forward of £1,408 makes the amount available £1,803. The payment of a dividend of 5%, less tax, on the Preference Stock, was confirmed at the annual meeting, leaving a balance of £1,377 to be carried forward.

Stourbridge.

The quantity of gas sold during the year ended March 31 last by the Borough of Stourbridge Gas Department was 440,829,700 cu.ft., as compared with 444,576,500 cu.ft. in the preceding twelve months, or a decrease of 3,746,800 cu.ft. The greater part of the falling off has been in prepayment consumption. The quantity of gas used for public lighting shows a gratifying increase. Receipts on revenue account are up £1,468, while the expenditure is more by £2,454. After meeting all charges, there is a surplus of £3,376, of which, under the arrangement in force, 75% goes to the General District Fund, and 25% to the Contingency Fund. A year ago, the net profit so divided was £3,583. On the present occasion it is necessary to transfer an amount of £167 10s. 2d. from the Equalization Fund, in order to bring the contribution to the General District Fund to the agreed amount of £2,700. In view of the continued increase in the cost of all raw materials, the price of gas was increased, as from the beginning of the September quarter, by 2½d. per 1,000 cu.ft. (on the sliding-scale). To maintain the surplus at about the standard figure, it is proposed to borrow for the new mains required, for the next three years at any rate, instead of paying for them out of profits, as formerly.

COMPANY MEETINGS

South African Lighting Association, Ltd.

The Fiftieth Ordinary General Meeting of the South African Lighting Association, Ltd., was held at the Association's London Offices, 48, Copthall Avenue, E.C. 2, on Wednesday, June 14, 1939—Mr. WILLIAM CASH, J.P., F.C.A., Chairman of Directors, presiding.

The SECRETARY (Mr. William Cash, Jnr., M.A., F.C.A.) read the notice convening the meeting, together with the minutes of the previous ordinary general meeting, held on June 15, 1938, which were confirmed and signed. He then read the report of the Auditors on the Accounts and Balance-Sheet.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN said he presumed the shareholders present would take the report and accounts as read, and it therefore became his duty to move the first resolution, which was that they be received and adopted. He did not think that he need trouble them with any long speech, or that there was a great deal to which he ought to call their attention. There were, however, a few items in the accounts upon which he might briefly remark.

Figures from the Accounts.

If they would look at the Revenue Account, they would see that the balance of profit for the year was (omitting the odd shillings and pence) £5,676, and this amount was some £76 less than the corresponding figure for 1937. But they would observe on the left-hand side of the account an item "Engineering Adviser's Expenses to South Africa, £253." This was an altogether exceptional item. Also, included in the "Manufacturing Expenses" was the usual item (which they would see referred to in the report) in connexion with retort renewals. This was based upon the quantity of coal carbonized, and in view of their experience, they had increased this contribution by 50%, making an additional charge of £344. Then among the expenses in South Africa there was £100 included as part of the outlay in connexion with Mr. Goldsmith's leave of absence and attendance here in London. It would be noted in the Balance-Sheet that they had carried forward £150 of his expenses, because he was here partly in 1938 and partly in 1939. These three items made a total of £697 which might be regarded as abnormal in comparison with the preceding year. On the other hand, they had brought in the sum of £500, which had been transferred from Income-Tax Account. When they came to the final figure of the carry-forward, it would be seen, as was shown in the report, that it was £107 more than the amount brought into account. Local profits in South Africa showed a distinct advance on the previous year. One other item to which he would draw attention, which also might be regarded as of an exceptional character, was that of "Bad debts," appearing in the present accounts as £313, whereas a year ago the figure was only £113. This increase was the result of a very unfortunate experience. A builder who had done business with the Association for years had erected a big block of flats, and he asked them to equip these flats with various gas-consuming appliances. Unluckily, however, the builder became bankrupt, and this would, he was afraid, involve the Association in the loss of about £200.

In connexion with residuals, he might mention that, while Port Elizabeth had not done quite so well with coke, Grahamstown had done better. The net receipts, so far as coke was concerned, were £180 more. On the other hand, both places had done badly with their tar. It was a very difficult matter to dispose of their tar, and the net receipts were down by very nearly £500. Thus the receipts from residuals as a whole were less by £315. Coal had cost them somewhat more. The price at Port Elizabeth was up by 1s. 6d. per ton, and at Grahamstown by 1s. 1d. per ton. The actual carbonizing results, however, had been slightly better, so that the costs translated into cubic feet of gas were not much more so far as coal was concerned.

Increased Receipts from Gas Sales.

As was stated in the report, sales of gas in Port Elizabeth showed an increase of 2·44%, and those at Grahamstown an increase of 11·88%. This meant that the receipts from the sale of gas were up by £883, which was distinctly satisfactory. Another satisfactory point about Port Elizabeth was that the increase had been spread over each section of consumers. The ordinary meter consumption was up by over 3%, the slot meter consumption by 1¼%, and the industrial consumption (in which were included all consumers taking more than 10,000 cu.ft. per month) by 2¼%. An all-round increase of this nature was gratifying. At Grahamstown, where they had a number of substantial consumers, they were providing equipment in connexion with the Mental Institution which would come into operation in 1939. The Manager reported that trade conditions were unsettled in South Africa in the second half of the year—as no doubt was the case almost everywhere else—and he had also had to contend with relatively warm weather during the last month or two of 1938.

Glancing at the Balance-Sheet, it would be seen that they were still working with a substantial Bank overdraft. At the same time, the Income-Tax Reserve of £1,000 was free, and was really a surplus amount. The balance of profit and loss was within about £100 of what it was a year ago. Investments, at market value, still showed a substantial surplus of some £1,300 over the figure at which they stood in the Balance-Sheet, and the cash position was £1,100 better than was the case a year ago.

Visits to South Africa and England.

Having now dealt with the figures in the accounts, there were one or two general matters to which he might refer. It would be remembered that when they met a year ago, Mr. John Terrace, who had returned from South Africa, was seriously ill, and was not able to be with them. They were very glad to have him with them that day, and thus to have an opportunity of acknowledging in his presence the great benefit that they had derived from his visit to South Africa. Then, as the report told them, their Engineer and General Manager, Mr. Goldsmith, had been home from the latter part of 1938 to the middle of February, 1939. This, again, was a decided advantage to the Board. They had numerous meetings with him, and he was able to go and see all the latest things which would interest a man responsible for the manufacture of gas. Mr. Goldsmith inspected the most modern types of plant, and the Directors took the opportunity of discussing many matters with him. Among other things, Mr. Goldsmith was able to tell them of his difficulties in connexion with the competition of electricity. He also informed them of one particularly gratifying thing—namely, that the relationships of the Association with the Local Authorities were still very cordial. Since his return to South Africa, he had had meetings with the different bodies on various matters, all of which were of a most friendly character. He also spoke of new factories in Port Elizabeth (quite a number of which were taking a supply of gas), and of the way in which the town was deliberately setting itself out for industrial development.

Gas Prices and Tariffs.

Another matter which the Board had discussed at length with Mr. Goldsmith was the price of gas, which they would all like to see reduced, if the Association could afford to do this. They went into the question of tariffs with him, and they gave him authority, when he returned, to make up his mind as to the inauguration of some sort of tariff which might induce some customers to increase their individual consumption of gas. Another subject which they discussed with him was an improved type of plant, which they would like for certain reasons to see substituted for the existing plant of an older type, because, as Mr. Terrace had pointed out, undoubtedly a modern plant would effect economies in the cost of manufacture, and so provide a return on the necessary capital. They had, however, arrived at no definite decisions on this matter, so that he had nothing final which he could tell them about it.

He did not think there was anything more to which he need allude. Shareholders would see that it was proposed once more to pay 4% dividend, from which tax this year would be deducted at 5s. in the pound, having regard to the allowance for double taxation which they paid in South Africa. The result would be that they would carry forward £107 more than they had brought into account, whereas a year ago they were carrying forward £88 less than the amount that had been brought in. This was not, perhaps, a very large gain, but still it would be seen that they had earned their dividend, and in this sense the shareholders would be satisfied. He would now formally move the adoption of the report and accounts.

Mr. HENRY WOODALL, J.P., M.Inst.C.E., seconded the resolution, which was carried unanimously without discussion.

Thereafter, on the proposition of the CHAIRMAN, seconded by

Mr. T. N. G. JENNINGS, a dividend for the year was declared of 4%, less income-tax at 5s. in the pound.

Long Service.

Mr. HENRY WOODALL said it was next his privilege and pleasure to propose the re-election of Mr. William Cash as a Director. Mr. Cash and he had been debating as to how long they had been connected with the Association. They were unable to arrive at an exact date, but it was certainly going on for fifty years. They had had their ups and downs. At one time the Association were able to pay 10% and put something to reserve, but of late things had not been quite so satisfactory. He was, however, pleased to think they had earned their 4%, and they had to thank their Manager for having done his work well. Port Elizabeth was progressive, and he did not see why the Association should not go on and prosper. As the Chairman had said, they might get more economical works, but it would cost a great deal of money, and to-day it was not at all easy to raise capital. Therefore the matter needed careful consideration, which the Board were giving to it. He was sure the shareholders would unanimously agree that they could not have a better Chairman than Mr. Cash, and so would re-elect him to the Board.

Mr. JOHN TERRACE said he was very glad to have the opportunity of seconding this resolution. He was not going to try to "paint the gilded lily." Mr. Cash was so well known throughout the Gas Industry, that it was quite unnecessary for him (the speaker) to sing his praises. Other members of the Board also possessed great ability. As for himself, inasmuch as he did not possess all the qualifications that he might have had, the Directors had suggested that he should visit South Africa and complete his education by learning what he could of the Association's activities on the spot. The Board already knew that conditions there were not at all as they were in the old country. The town had drifted away from the part which they originally supplied, and it had been very difficult sometimes to try and follow up to the houses built—scattered about as though shaken from a pepper-box, and without any indication, when one was erected, as to when another was likely to be put up and require a supply from the same main. He had had a very interesting time at Port Elizabeth. They were succeeding in attracting industry to the town, and about one-third of their load was now industrial. There were, in fact, quite a number of real industrial consumers, who would go on using gas. He had also visited Johannesburg and Cape Town, and the same story was told wherever one went—except, perhaps, in Johannesburg, where they were going ahead by leaps and bounds, and expanding almost faster than they could cope with. But generally speaking in South Africa there was a very big proportion of the population who had never used gas, and did not even know what it was. They came from the country into the town for a short time, and then went back to the country. People there did have a very uphill fight. With regard to the motion before the meeting, he was confident that the Association could not be better served by anyone than by their present Chairman.

The CHAIRMAN (after the resolution had been unanimously carried) said he was much obliged for the too kind remarks that had been made about him, and was particularly glad that Mr. Terrace had taken the opportunity of saying a word or two about his visit to South Africa. They had looked forward a year ago to hearing something from him. However, they were delighted now to find him in good health again after his illness. He was very thorough in looking after the affairs of the Association.

On the motion of Mr. F. R. SMITH, seconded by Mr. WILLIAM ARNOTT, the Auditors (Messrs. Deloitte, Plender, Griffiths, & Co.) were re-appointed.

Votes of Thanks.

The CHAIRMAN said he would like to propose a hearty vote of thanks to the officers in Port Elizabeth and Grahamstown. They were very pleased indeed to meet Mr. Goldsmith, and they had it in mind to arrange later on for one or two of the other members of the staff to come over here at intervals, so that they might keep themselves *au fait* with matters in the Gas Industry. All their people in South Africa did their best. In addition to Mr. Goldsmith, he might mention Mr. Haley, at Grahamstown, and Mr. Coulson, at Port Elizabeth. They were, one and all, keen to do everything they possibly could to push gas in every way, in the face of fierce competition. Both Board and shareholders would wish to thank them for their services during the past year. He would also like to include in the vote the Secretary and other members of the London staff.

Mr. ARNOTT, seconding the vote (which was heartily accorded), remarked that, having been out in South Africa for many years, he knew how much such a vote was appreciated by those so far from home. It was a pleasure to add his testimony to the value of their services.

The SECRETARY said he would be delighted to pass on the vote to South Africa and to the London staff, and he felt sure this appreciation would encourage them to try to do even better in the future than they had done in the past.

A vote of thanks to the Chairman and Directors, proposed by Mr. SMITH, brought the meeting to a close.

Malta and Mediterranean Gas Company, Ltd.

The Annual General Meeting of the Malta and Mediterranean Gas Company, Ltd., was held on Tuesday, June 13, 1939, at the London Offices of the Company, 5, Great Winchester Street, E.C. 2—Mr. A. M. PADDON, M.Inst C.E. (Chairman of Directors), presiding.

The SECRETARY AND GENERAL MANAGER (Mr. G. Murray Burton) read the notice convening the meeting, together with the report of the Auditors. The list of stockholders was duly sealed and signed, and the Directors' Report and Statement of Accounts for the year ended March 31, 1939, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in presenting the Accounts for their acceptance, pointed out that they constituted a considerable improvement upon those for which the Board were responsible twelve months ago. That improvement, however, was qualified by certain unfavourable features to which he would draw attention in due course.

Dealing first with the improvements in their position, the Chairman said that the sales of gas, on a volumetric basis, had increased by 13%, which, following upon a whole series of reductions, was very gratifying. Then again, the number of their consumers had increased by 7%, which was a considerable increase over a period of twelve months.

When they came to the results of these increments, it would be seen that they had received by the sale of gas £2,802 more than a year ago, while rental of meters, stoves, &c., showed an improvement of £446; residual products had brought in £287 more. The last item was a little disappointing, but it must be appreciated that market conditions for residuals in Malta were not the same as in this country.

On the other side of the account it would be seen that expenditure had gone up in almost direct proportion to their increased receipts. Coal had cost over £300 more; but the main item which accounted for the increase in expenditure was that relating to maintenance, renewals, and improvements of works, plant, &c.—an item which was more compendious than the heading indicated. The increased expenditure here was £2,517, which analysis showed to be almost entirely due to the new plant they had been compelled to provide to meet the influx of business to which he had already referred, together with outlay on more modern forms of apparatus, such as refrigerators. However, as this was by way of meeting increased business it was not entirely to be regretted. The total increase in expenditure amounted to £3,139, which went a long way towards offsetting the increased receipts which he had mentioned. The other item of expenditure which had increased was in respect of administration—by £465—which was another natural result of increased business. Bad debts showed an improvement of £83; but the balance carried to the Profit and Loss Account was only £14 more than a year ago. This, however, was qualified by the fact that in the meantime their capital had been reduced very considerably—so that they no longer required the amount of profit which was previously necessary to meet the demands made upon them.

Profit and Loss Account.

Turning to the Profit and Loss Account, the Chairman observed that the item of expenditure on new buildings and reserve therefor, amounting to £283, was the balance on account of the new showroom.

Lower Capital Figure.

Altogether they had expended by way of capital and in meeting their other expenses nearly £2,000 more, so that although the profit was not so great as they might wish to see, the essential money-earning capacity had been improved by that amount of

£2,000. The net result was that as they brought into the Account £17,422 and took out £17,112, there had been a reduction of £310—a decrement which was relatively trifling when they realized that the capital stood at a very much lower figure as compared with a year ago.

If they would look at the Balance-Sheet they would see that the capital upon which they had to provide interest was £73,845 as against £123,065. Turning to the other side of the Balance-Sheet, they would see that their investments in trustee securities after being depleted to meet the reduction in capital, stood at a book value of £71,213. This represented a market value at March 31, 1939, of £84,897, so they had in no wise sacrificed their relative position as between the Amortisement Account and the amount they would become answerable for at the termination of their concession. Therefore, he thought he was justified in referring to the accounts as an improvement, and if they were not restricted to any appreciable extent they should be able to maintain that improvement throughout the coming year.

Future Prospects.

Referring to the future prospects of the Company, the Chairman concluded by observing that when the Fleet went away 30,000 people went as well, and when the Fleet returned so did the potential consumers. At the same time, there was a certain amount of activity on the Island in regard to the building industry, and as the Company's relations with the authorities were good and had never been better, they would obtain what benefit there was to be had.

The CHAIRMAN then formally moved the resolution for the adoption of the Report and Accounts, which was seconded by Mr. A. W. OKE, M.A., LL.M.

Mr. A. D. DODGSON enquired whether it was anticipated that the increased cost of maintenance and renewals was a recurring item or whether the expenditure on this account was more or less once and for all.

The CHAIRMAN said he was afraid they must regard it as a static item. The Company had to spend money on extensions of mains and in connexion with increased business, which, represented by a 13% increase in gas sales last year, was considerable. While the increase in business for the time being might not be so marked as it had been, it nevertheless entailed certain obligations upon the Company. They must therefore not assume that the item of maintenance and renewals would be greatly reduced during the current year.

The resolution for the adoption of the Report and Accounts was then put to the meeting and carried unanimously.

Dividends.

The CHAIRMAN thereafter moved:

> That final dividends at the full rates on the First and Second Preference Stock and a dividend of 5% (free of income-tax) on the Ordinary Stock, be declared, making for the year (with the interim dividends paid in December last) a total distribution of 7% on the First Preference Stock, 7½% on the Second Preference Stock, and 10% (free of income-tax) on the Ordinary Stock.

The resolution was seconded by Brig.-General G. V. CLARKE, C.M.G., D.S.O., and carried unanimously.

Re-Election of Director and Auditors.

The retiring Director (Mr. E. L. Burton) was re-elected and the Auditors (Mr. William Cash, F.C.A., and Mr. Hyde Clarke Burton, F.C.A.) were duly re-appointed.

The proceedings then closed with a vote of thanks to the Chairman and Directors and to the staffs at London and Malta.

TRADE NEWS

An Artistic Production.

"Four thousand years' loyal service" seems a fantastic claim—even for a firm of such long and honourable standing as the Lancashire Dynamo and Crypto Co., Ltd. And elucidation of that claim makes it but a little less striking. One hundred and thirty-four men and women have each worked with the Company for twenty-five years or more. Add to which they are dependable, like the motors they make—skilled in their craft, willing, and competent to counsel the hundreds of younger workers who are always keen to uphold the high standard of L.D.C. workmanship. In a word, they are craftsmen. We know because we have met them in a publication of high artistic merit recently published by the firm. This illustration is a small example of the artistic work which abounds in the brochure. It is written in a direct and readily appreciated way, and any readers of the "GAS JOURNAL" who have not received a copy should write the firm at their Publicity Department, 94, Petty France, London, S.W. 1, asking for Brochure M.L.50.

"Better Kitchens."

This is the title of a booklet, which should prove of much value to builders, architects, and estate owners. It is published by Electrolux, Ltd., 153-155, Regent Street, W. 1, and gives many dimensioned details for building-in Electrolux gas-operated refrigerators. It is liberally illustrated.

"Round the Corner—

with 'Stanton' screwed-gland pipe joints for easy curves without specials." This is effectively demonstrated by a novel piece of publicity by the Stanton Ironworks Co., Ltd., near Nottingham. You open a folder and an illustration of a straight length of pipe bends away to show the sort of curve that can be negotiated with this joint.

The British Aluminium Company, Ltd.

The British Aluminium Company, Ltd., are transferring their branch office and aluminium warehouse from 25-29, Pancras Road, N.W. 1, on July 1, to more spacious premises at Park Avenue, North Circular Road, N.W. 10. Telephone: Willesden 4817-8.

Ample stocks of the Company's products—aluminium and its light alloys, in ingot and semi-manufactured forms—will be maintained at this depôt, which will be under the management of Mr. W. J. Allen. The Company also hold stocks of aluminium in most forms in warehouses at Birmingham, Leeds, Bristol, Newcastle-on-Tyne, and Glasgow, and have branch offices at Manchester and Dublin.

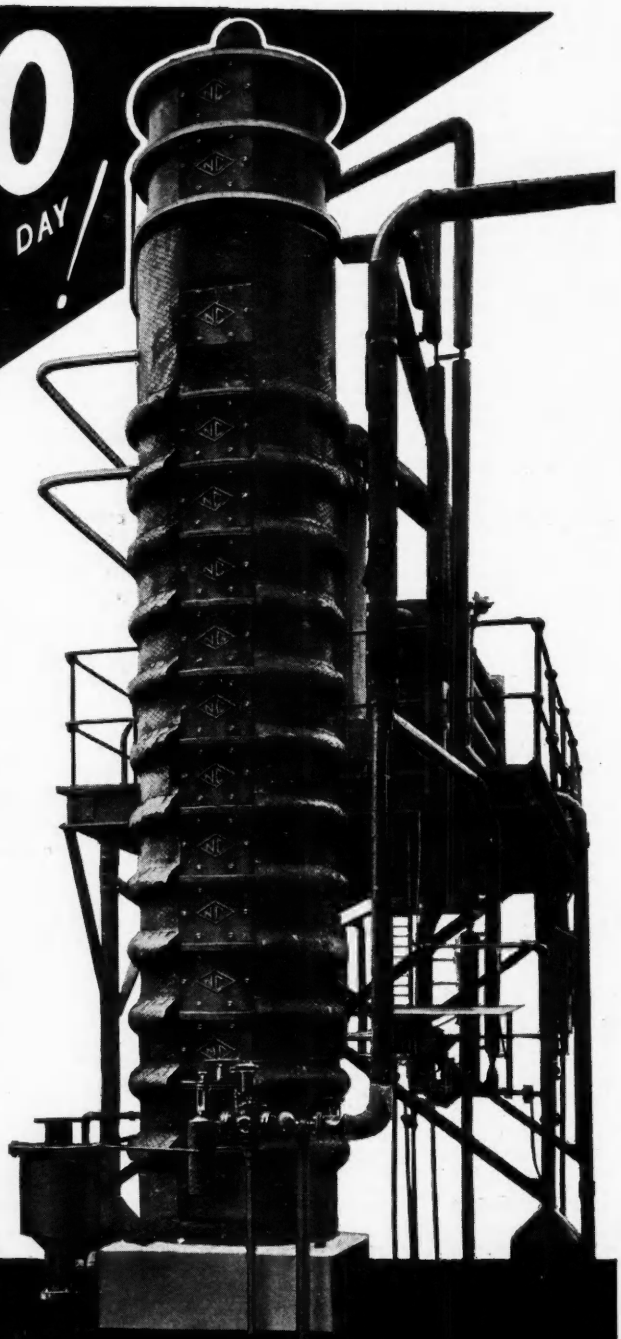
Protection Against Incendiary Bombs.

We have received a copy of No. 6 of an informative series of booklets dealing with problems which have been solved by the use of asbestos-cement. These are being published at fortnightly intervals by Messrs. Turners Asbestos Cement Company, Branch of Turner & Newall, Ltd., and the issue in question deals with the problem of safeguarding buildings against the threat of incendiary bombs. This little booklet gives full details of how "Turnall" asbestos wood can be applied as a fire-resisting agent in any building and it also shows by means of photographs how a series of tests with incendiary bombs established the value of the material for this class of work. Copies of this booklet will gladly be sent free upon request to all who are interested in the protection of buildings from fire.

An Excellent Example of Adaptability.

This tank vehicle on the 3-ton Austin chassis has just been put into commission by the Sheffield and District Gas Company, the tank equipment being built by W. P. Butterfield, Ltd., of Shipley. This vehicle forms an excellent example of the adaptability of the modern commercial vehicle as exemplified by this new Austin model.

500,000 GALLONS OF GAS LIQUOR PER DAY!



This is the distillation capacity of Thorncliffe Gas Liquor Concentration Plants ordered in the last five years.

Completely automatic Gas Liquor Concentration Plant installed for the Bedford District Gas Company. This Plant is capable of dealing with 800 gallons of gas liquor per diem and producing concentrated gas liquor of 20-22% ammonia content.

Write for particulars to :—

NC

NEWTON, CHAMBERS & CO., LTD.,

THORNCLIFFE, near SHEFFIELD

Markets and Manufactures

Current Sales of Gas Products

The London Market

June 19.

There was no alterations to record in the values of Tar Products in the London market, to-day's values being as follows:

Pitch, nominal, at about 25s. to 26s. per ton f.o.b.

Creosote, about 3½d. to 3¾d.

Refined tar, 3¾d.

Pure toluole, about 2s. 5d. to 2s. 6d.

Pure benzole, about 1s. 9d.

95/160 solvent naphtha, 1s. 7d. to 1s. 8d.

90/160 pyridine, about 11s.

All per gallon naked at makers' works.

The Provinces

June 19.

Crude Gas-Works Tar, 10s. to 15s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 25s. to 27s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 25s. to 27s.* Toluole, naked, North, 1s. 10d. to 1s. 11d. Coal tar, crude naphtha, in bulk, North 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4¼d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3¾d. to 4¼d.; low gravity, 4d. to 4¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4¼d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5⅜d.; heavy tar oil, gr. less than 1.080, 4½d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

Scotland

GLASGOW, *June* 17.

Market remains rather uninteresting, with prices easy. Any business being placed is small and highly competitive.

Crude gas-works tar.—Actual value is now about 28s. to 30s. per ton *ex* works in bulk.

Pitch of vertical quality is quiet, but price is unchanged at about 20s. to 21s. per ton f.o.b. for export and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—A good demand now exists in the home market, with price at 3¾d. to 4d. per gallon, while for export supplies can be readily secured at 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil is quietly steady, with supplies obtainable at the following prices: Specification oil, 3¼d. to 3½d. per gallon; low gravity, 4¼d. to 4½d. per gallon; neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid.—Business is still very quiet and prices are nominal as follows: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is unchanged at round 5d. to 5½d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade can be secured at 1s. 4d. to 1s. 5d. per gallon, and 90/190 heavy naphtha at round 1s. 1¼d. to 1s. 2d. per gallon.

Motor benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—Prices are nominal at 9s. 6d. to 10s. 6d. per gallon for 90/160 grade and 11s. 6d. to 12s. 6d. per gallon for 90/140 grade.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9¼	to	0	10	per gall. at works
Motor „ ..	1	3	„	1	3½	„ „ „
90% „ ..	1	4	„	1	4½	„ „ „
Pure „ ..	1	8	„	1	8½	„ „

Contracts Advertised To-Day

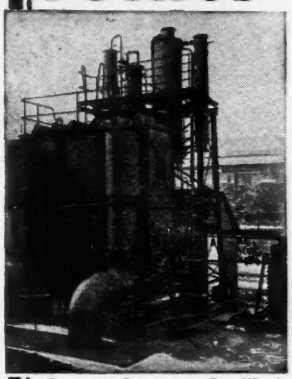
Gasholder.
Skipton Gas Department. [p. 950.]

Lead Pipes.
Rochdale Gas Department. [p. 950.]

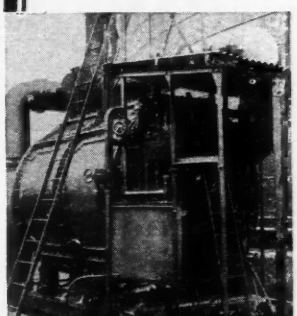
Holyhead and North Wales

The accounts of the Holyhead and North Wales Gas and Water Corporation, Ltd., are made up to March 31, and those for the past twelve months show a net profit of £4,471. For the preceding year, the net profit was £4,674. The Corporation operate eight works. Gas sold in the past twelve months totalled 97,722,600 cu.ft., as compared with 97,746,800 cu.ft. in the previous year. The dividend is repeated at 5%, and the sum of £1,000 is again transferred from Profit and Loss Account to the Reserve Fund Account. In the Revenue Account, repairs and maintenance of works and plant figure at £5,176, which compares with £5,652 a year ago.

These are "Permac" metal-to-metal Joints



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Wouldn't it pay you to use it?

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil — screw pipe or flange. Send for particulars.

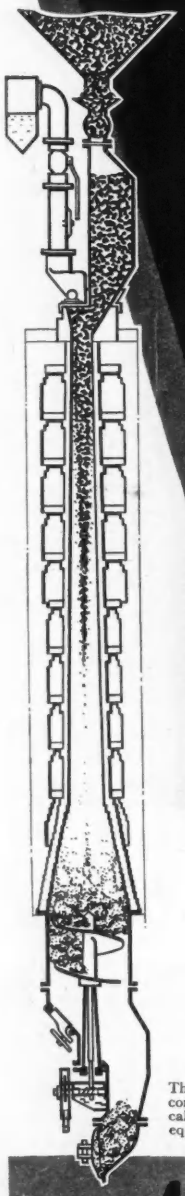
Permac
METAL-TO-METAL JOINTING MATERIAL

Sole manufacturers:—

THOMAS & BISHOP LTD
37, Tabernacle St.
LONDON, E.C. 2

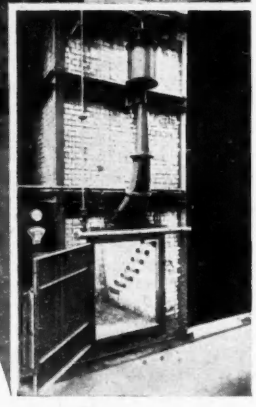
Telephone: Clerkenwell 3351 (2 lines)

WEST'S



Three installations of Glover-West vertical retorts, with coke-grading and waste-heat recovery equipment, at the Cottesloe gasworks of the Johannesburg Municipal Gas Department, and *(below)* step-grate producer equipped with steam-jet air injector to facilitate the burning of small coke and breeze under pressure—a view in the Glover-West vertical retort house at the Meadow Lane works of the Leeds Corporation Gas Department.

Carbonizing Plants



- Increased capacity in relation to ground area covered.
- Output readily adjustable to meet fluctuating demands.
- High yields of gas and coke with low maintenance costs.
- Clean working conditions within the retort house.
- Modern building design and smokeless operation.

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MILES PLATTING, MANCHESTER 10 & COLUMBIA HOUSE, ALDWYCH, W.C.2

The Glover-West continuous vertical retort and equipment.

Glover-West Vertical Retorts

AND WESTVERTICAL CARBONIZING CHAMBERS

434 PLANTS BUILT OR ORDERED IN 24 COUNTRIES

GAS STOCKS AND SHARES

Markets have again suffered a set-back under the influence of the external situation and business last week almost came to a standstill. Although affairs at home are favourable, as evidenced by increased exports and the maintenance generally of trading profits, the latest events abroad have been disturbing enough to lower prices in practically all sections. British Funds led the way in the general marking down of values, while home rails, despite increased traffic receipts, suffered severely and lost much of their recent good improvement. Many leading industrials also lost heavily.

For the time being at any rate the gas market has only felt the back-wash of the reactionary movement. It is true, the volume of business was slightly less than the previous week, but with few exceptions, and these were not all in a downward direction, quotations closed unchanged. Any reflection of the general position was practically confined to Gas Light units which eased 6d. to 21s. 3d., and to Imperial Continental, the latter declining 8 points to 119½ after touching 131 a short while ago. Montevideo also suffered a relapse with a drop of 5½ points to 60. At the Provincial Exchanges, however, it is pleasing to note that Hartlepool consolidated, which dropped heavily a few weeks ago, recovered 5 points to 76, and Newcastle units closed 3d. higher at 21s. 6d. At the Liverpool Exchange, the local Company's ordinary stock fell 2 points to 116. Nominal quotations in the Supplementary List remained unaltered.

The yields obtainable on gas "ordinaries" at current prices are attractive, and, having regard to the stability of the return offered by most companies over a long period of years, these stocks have been a favourite holding for the discriminating investor. In the list of those available at the present time, some of which are shown in the table below, all with two exceptions have distributed last year's rate of dividend for many years past.

Ordinary Stocks.

Amount Offered.	——	Dividend 1938.	Price.	Yield.
£		%		£ s. d.
1,200	British	7½	109	6 17 7
565	East Hull	5	90	5 11 1
5,000	Gas Light and Coke Company ..	£5 12s.	21/9	5 3 0
500	Do. 3½% Max.	3½	75	4 13 6
1,000	Imperial Continental	10	123	8 2 6
150	Liverpool	6	117½	5 2 3
120	Oriental	8 (a)	139	7 18 9
1,000	Severn Valley Gas Corporation ..	5½ (b)	21/–	5 4 9
2,000	South Metropolitan	5½ (c)	93	5 18 3
1,000	South Suburban	6	110	5 9 3
500	Tottenham	6½	117	5 15 3
1,000	United Kingdom Gas Corporation ..	5	17/–	5 17 9

(a) Paid free of tax. (b) Increased in 1937 from 5½%. (c) Decreased in 1936 from 5¾%.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 16.	Rise or Fall on Week.
1,767,439	Mar. 6	8	8	Alliance & Dublin Cld ...	130—140	...
374,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	90—95	...
877,576	May 8	5	5	Assc'd. Gas & Water U'd'ts Crd.	16/—18/–	..
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	..
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/–	...
318,730	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/–	...
750,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	52—57	...
560,070	Feb. 20	7	7	Barnet Ord. 7 p.c.	150—160	..
300,000	Apl. 6	1/4½	1/9½	Bombay, Ltd.	19/—21/–	...
181,185	Feb. 20	9½	9½	Bournemouth sliding scale ...	185—195	..
690,526	,,	7	7	Do. 7 p.c. max. ...	153—158	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	125—130	...
50,000	June 5	3	3	Do. 3 p.c. Deb. ...	70—75*	...
362,075	,,	4	4	Do. 4 p.c. Deb. ...	95—100*	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	108—113*	...
357,900	Feb. 20	7½	7½	Brighton, &c., 6 p.c. Con. ...	135—140	...
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	118—123	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	110—115	−2½
855,000	Mar. 20	7	8	British Ord.	107—112	−2½
100,000	Dec. 19	7	7	Do. 7 p.c. Pref.	138—143	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97*	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	98—103*	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94*	...
100,000	22 May '33	6	4	Cape Town, Ltd.	½—1½	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1—2	...
150,000	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	Feb. 6	6	6	Cardiff Con. Ord.	112—117	..
237,860	June 5	5	5	Do. 5 p.c. Red. Deb. ...	102—107*	...
98,936	Mar. 20	2/–	2/–	Colombo Ord.	1 5/16—1 7/16	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	22/—24/–	...
739,453	Mar. 20	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/—18/–	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/–	...
1,775,005	Jan. 23	5	4	Commercial Ord.	55—60	...
140,000	Feb. 6	§13/4	4	Do. 4 p.c. Red. Pref. ...	95—100	...
620,000	June 5	3	3	Do. 3 p.c. Deb. ...	59—64*	...
286,344	Feb. 20	5	5	Do. 5 p.c. Deb. ...	105—110	...
200,000	,,	3⅜	4	Do. 3⅜ p.c. Red. Deb. ...	95—100	...
807,560	Feb. 20	7	7	Croydon sliding scale ...	123—128	...
644,590	,,	5	5	Do. max. div.	94—99	...
620,385	Dec. 19	5	5	Do. 5 p.c. Deb.	108—113	...
239,000	Feb. 6	5	5	East Hull Ord. 5 p.c.	88—93	...
187,215	Feb. 6	6	6	East Surrey Ord. 5 p.c. ...	102—107	...
176,211	June 5	5	5	Do. 5 p.c. Deb ...	105—110*	...
250,000	Nov. 7	8	4	Gas Consolidation Ord. 'B' ...	19/—21/–	...
250,000	May 22	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/–*	...
19,189,963	Feb. 6	5⅜	5⅜	Gas Light & Coke Ord. ...	20 9/—21 9/a	−–/6
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	70—75	−1
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	91—96	...
2,993,000	Jan. 9	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	92—97	...
8,602,497	May 22	3	3	Do. 3 p.c. Con. Deb. ...	70—75	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...
3,500,000	,,	4⅛	4⅛	Do. 4⅛ p.c. Red. Deb. ...	102—107	...
700,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
270,466	Feb. 20	6	6	Harrogate New Cons. ...	93—103	...
157,500	Mar. 20	‡1/–	‡1/–	Hong Kong and China Ord. ...	⅜—⅝	...
213,200	Feb. 6	5⅜	6	Hornsey Con. 3½ p.c. ...	93—58	−4
5,600,000	May 8	8	12	Imperial Continental Cap. ...	117—122	−8
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	...
235,242	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord. ...	145—155	...
63,480	Dec. 19	3	3	Maidstone 3 p.c. Deb. ...	58—63	...
45,000	May 22	†10	†10	Malta & Mediterranean ...	125—130	...
392,000	Apl. 6	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98—103	...
231,977	Feb. 20	5	5	M.S. Utility 'C' Cons. ...	95—100	...
968,658	,,	4	4	Do 4 p.c. Cons. Pref. ...	83—88	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 16.	Rise or Fall on Week.
350,076	Dec. 19	4	4	M.S. Utility 4 p.c. Deb. ...	90—95	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	107—112	...
125,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Eds.	94—97	...
675,000	May 8	†6	†3	Montevideo, Ltd.	55—65	−5½
250,000	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	135—140	...
396,160	Feb. 6	5	5	Northampton 5 p.c. max. ...	103—108	...
300,000	April 24	†9	†7	Oriental, Ltd.	135—145	...
468,537	June 5	7⅜	8	Plymouth & Stonehouse 5 p.c.	112—122*	...
621,667	Feb. 20	8¼	8¼	Portsmouth & Gosport Cors.	142—152	...
241,446	,,	5	5	Do. 5 p.c. max. ...	98—103	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	82—87	...
114,000	Feb. 6	5	5	Preston 5 p.c. Pref.	102—107	...
247,966	Dec. 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	96—101	...
625,959	Jan. 9	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Mar. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	7⅜—8⅜	...
441,275	May 8	1/1⅛	1/1⅛	Severn Val. Gas Cor. Ld. Ord.	20/—22/–	...
460,810	Mar. 20	–/10⅜	–/10⅜	,, ,, 4½ p.c. Cum. Pref.	19/ —21/–	...
133,201	Mar. 6	8¼	5	Shrewsbury 5 p.c. Ord. ...	141—146	...
9,000	June 5	‡4	‡4	South African Ord.	4—5	...
1,371,752	April 24	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	20/6—22/6	...
871,636	Mar. 6	–/10⅜	–/10⅜	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/—19/–	...
450,000	Feb. 6	4	4	Do. 4 p.c. Deb.	95—100	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
6,709,895	Feb. 6	5	6	South Met. Ord.	90—94	−½
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	118—123	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	85—90	...
1,895,445	Dec. 19	3	3	Do. 3 p.c. Deb.	70—75	..
1,000,000	Jan. 9	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...
600,000	,,	§31/–	3⅜	Do. 3⅜ p.c. Red. Deb. ...	93—98	...
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	105—110	...
512,825	,,	5	5	Do. 5 p.c. Pref.	103—108	...
500,000	,,	4	4	Do. 4 p.c. Pref.	85—90	...
250,000	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	90—95	...
888,587	June 5	5	5	Do. 5 p.c. Deb.	107—112*	...
250,000	,,	4	4	Do. 4 p.c. Deb.	89—94*	...
200,000	Feb. 6	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	90—95	...
427,859	Apl. 6	9⅜	1/2⅜	S. Western Gas & Water Ord.	15/6—17/6	...
160,523	Apl. 6	–/10⅜	–/10⅜	Do. 4½ p.c. Red. Cum. Pf.	18/6—20/6	...
110,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97*	...
750,541	Feb. 6	5	5½	Southampton Ord. 5 p.c. ...	104—109	...
148,836	June 5	4	4	Do. 4 p.c. Deb.	89—94*	...
350,000	Feb. 6	5½	5½	Swansea 5½ p.c. Red. Pref. ...	104—109	...
200,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
1,076,490	Feb. 20	6⅜	6⅜	Tottenham and District Ord.	112—117	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref.	110—115	...
62,235	,,	5	5	Do. 5 p.c. Pref.	103—108	...
453,380	Dec. 5	4	4	Do. 4 p.c. Deb.	91—96	+1
85,701	June 5	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100*	...
1,131,550	May 8	4	6	U. Kingdom Gas Cor. Ord. ...	15/6—17/6	...
1,051,280	May 8	4⅜	4⅜	Do. 4⅜ p.c. 1st Cum. Pref.	17/—19/–	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	18/—20/–	...
745,263	June 5	4⅜	4⅜	Do. 4⅜ p.c. 2nd Non-Cum. Pf.	13/6—15/6*	...
1,066,186	Mar. 6	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	92—97	...
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	120—125	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	112—117	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	85—90	...
1,343,964	Dec. 19	5	5	Do. 5 p.c. Deb. ...	109—114	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	90—95	...
400,000	,,	§25/–	3⅜	Do. 3⅜ p.c. Red. Deb. ...	93—98	...
558,342	Feb. 6	6⅜	6⅜	Watford and St. Albans Ord.	112—117	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
200,000	,,	5⅜	5⅜	Do. 5⅜ p.c. Pref. ...	110—115	...
200,000	,,	§16/8	4	Do. 4 p.c. Rd. Pf. (1973/8)	93—98	...
100,000	—	—	—	Do. 4 p.c. Red. Pf. (1959)	97—102	...
200,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	90—95	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations June 16.	Rise or Fall on Week.
202,152	Mar. 20	5	5	Ascot Ord.	59—104	...
128,182	Dec. 19	5	5	Do. 5 p.c. Pref.	103—108	...
31,035	Mar. 20	-/4½	-/4½	Associated Utilities 4 p.c. Pref.	15/-—17/-	...
100,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Feb. 20	8	6	Bognor Orig. Ord. 'A' ...	140—150	...
62,210	,,	8	8	Do. New Addl. 'A' ...	140—150	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	135—145	...
37,440	Feb. 6	10	10	Cam. Univ. & Town 10 p.c. max.	165—175	...
125,970	,,	7	7	Do. 7 p.c. max.	115—125	...
39,025	,,	5	5	Do. 5 p.c. max.	95—100	...
96,410	Feb. 6	4½	4½	Cardiff 4½ p.c. Pref.	93—98	...
150,000	Feb. 20	4	4	Croydon 4 p.c. Pref.	91—96	...
130 000	Dec. 19	4	4	Do. 4 p.c. Deb.	92—97	...
65,000	Mar. 6	7½	7½	Eastbourne 'A' 5 p.c. ...	122—132	...
198,000	,,	6	6⅔	Do. 'B' 3½ p.c.	105—115	...
112,312	,,	5	5	Do. 5 p.c. Pref.	102—107	...
130,000	Dec. 19	5	5	Do. 5 p.c. Deb.	107—112	...
24,000	Feb. 20	8½	8½	Great Yarmouth 8½ p.c. max.	30—35	...
59,400	,,	7½	7½	Do 7½ p.c. max.	27—32	...
51,160	June 5	5½	5½	Do. 5½ p.c. Deb.	115—120*	...
152,600	Feb. 20	8	9	Guildford Cons.	150—160	...
54,055	,,	5	5	Do. 5 p.c. Pref.	102—107	...
68,250	June 5	5	5	Do. 5 p.c. Deb.	103—108*	...
156,600	Feb. 20	7	7	Hampton Court Cons. ...	103—113	...
80,000	Mar. 6	4	4	Lea Bridge 4 p.c. Pref. ...	82—87	...
60,000	,,	6	6	Do. 6 p.c. Pref.	118—123	...
94,676	June 5	4	4	Do. 4 p.c. Deb.	87—92*	...
73,620	Mar. 6	8½	8½	Luton Cons. 'A'	150—16	...
107,560	Mar. 20	4	5½	Mid Kent Ord.	8½—9½	...
230,940	Feb. 6	10	10	Oxford & District Ord. ...	165—175	...
47,112	,,	5	5	Do. 5 p.c. Pref.	102—107	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,153	May 8	7½	7½	Peterborough Ord.	134—139	...
64,950	Mar. 6	7½	7½	Redditch Ord.	115—125	...
166,850	Feb. 6	8	8	Romford Ord.	137—142	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—102	...
44,000	Mar. 20	5	5	Do. 5 p.c. Deb.	107—112	...
25,570	Feb. 6	5½	5½	Rugby 5½ p.c. Pref.	118—123	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	June 5	5½	5½	Do. 5½ p.c. Deb.	113—118*	...
110,550	Feb. 20	8	8	Ryde Ord.	137—147	...
270,686	Mar. 20	7	7	Slough Ord.	120—130	...
21,000	June 5	5	5	Do. 5 p.c. Deb.	103—108*	...
28,872	May 8	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	16/—18/-	...
28,666	Mar. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/-	...
117,228	Feb. 20	5	7	Swindon Cons.	100—105	...
60,425	June 5	5	5	Do. 5 p.c. Deb.	103—108*	...
64,380	Dec 19	5	5	Torquay & Paignton 5 p.c. Pref.	102—107	...
130,000	Feb. 6	5	8	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	92—97	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106	...
98,384	Feb. 6	6	6	Wolverhampton 6 p.c. Pref.	115—120	...
160,000	Dec. 19	5½	5½	Do. 5½ p.c. Rd. Db.	103—106	...
90,000	Dec. 19	5	5	York 5 p.c. Red. Deb. ...	102—107	...
133,640	Feb. 20	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	115—120	...
120,000	,,	5	5	Do. 5 p.c. Pref.	102—107	...
35,000	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	112—117	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 16.	Rise or Fall on Week.
347,756	Feb. 6	5	6	Bath Cons.	115—117	...
1,667,250	Feb. 6	5	5	Bristol, 5 p.c. max.	105—108	...
120,420	June 5	4	4	Do. 1st 4 p.c. Deb. ...	96—100*	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	96—100*	...
328,790	,,	5	5	Do. 5 p.c. Deb.	113—116*	...
274,000	Feb. 20	5	5	Newport (Mon.) 5 p.c. max. ...	95—97	...
13,200	Mar. 20	7	8⅔	Pontyp'l Gas & W. 10 p.c. 'A'	12⅝—13½	...
13,600	,,	6	5	Do. 7 p.c. 'B' ...	11½—12	...
40,000	,,	6	5	Do. 7 p.c. 'C' ...	11½—12	...
140,778	Feb. 6	5	5	Weston-super-Mare Cors. ...	103½—105½	...
64,338	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—101	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb. ...	149—152	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 16.	Rise or Fall on Week.
157,150	Feb. 6	5	6½	Chester 5 p.c. Ord.	107—110	...
92,500	June 5	4	4	Do. 4 p.c. Pref.	94—98*	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	86—89*	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb ...	96—100*	...
2,167,410	Feb. 20	6	6	Liverpool 5 p.c. Ord.	115—117	−2
245,500	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100—105	...
306,083	Jan. 23	4	4	Do. 4 p.c. Deb.	99—101	...
106,280	Feb. 6	10	10	Preston 'A' 10 p.c.	177—187	...
188,219	,,	7	7	Do. 'B' 7 p.c.	129—139	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 16.	Rise or Fall on Week.
122,577	Feb. 20	8	8	Blyth 5 p.c. Ord.	157½—158½	...
732,000	Feb. 20	3	3	Hartlepool G. & W. Co. & New	75—77	+5
2,061,315	Feb. 6	5	5⅔	Newcastle & Gateshead Con.	21/3—21/9a	+3
682,856	,,	4	4	Do. 4 p.c. Pref. ...	88—89	...
776,706	June 5	3½	3½	Do. 3½ p.c. Deb. ...	85½—87½*	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	101—103	...
332,351	Feb. 6	6	6	Sunderland 6 p.c. max. ...	132½—134½	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 16.	Rise or Fall on Week.
542,270	Feb. 6	6	9	Derby Con.	132—137	...
55,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 19	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	103—108	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 16.	Rise or Fall on Week.
10,000	Feb. 6	10	10	Great Grimsby 'A' Ord. ...	180—190	...
6,500	,,	10	10	Do. 'B' Ord. ...	180—190	...
79,000	,,	10	10	Do. 'C' Ord. ...	175—185	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	137—140	...
95,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—102	...

a The quotation is per £1 of Stock.
* Ex div.

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